Stichting DLO
Centre for Fishery Research (CVO)

KB – WOT Fisheries Research; programme for 2010

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Contents:

1 Summary

LNV programme WOT 5 covers the execution of statutory tasks (WOT) in fisheries carried out by DLO. Part of the KB programme, presented in this report, contains resources earmarked to maintain and develop the expertise needed to carry out the WOT programme. As well as maintaining expertise, innovation is an important part of the programme. The programme is also part of the Wageningen UR Kennisbasis and comes under the theme KB01: “Groene en blauwe ruimte”. This report describes the allocation and utilisation of the Kennisbasis budget in 2010. The available budget in 2010 is €621 000. The structure of the KBWOT programme is similar to that in 2009. The money is spent through projects, each of which is described in this report. The projects are split up into four priority research areas: A) Influence of changes in the environment on marine ecosystems, B) impact of fisheries on ecosystems, C) changing fishery management, D) maintenance and international exchange of key WOT expertise. These priority research areas have been developed with the agreement of LNV. All of these areas fall under the wider WUR kennisbasis themes.

Samenvatting

In LNV-programma WOT 5 worden door DLO de Wettelijke Onderzoek Taken (WOT) uitgevoerd die betrekking hebben op de visserij. In het KB programma, beschreven in dit rapport, worden middelen bestemd om de deskundigheid te handhaven en kennis te ontwikkelen nodig voor de uitvoering van het WOT programma. Naast het handhaven van deskundigheid, is innovatie een belangrijk element in het programma. Het programma is een onderdeel van Wageningen UR Kennisbasis en valt onder het thema KB01: „Groene blauwe ruimte“. Dit rapport beschrijft de toewijzing en het gebruik van de begroting Kennisbasis in 2010. Het beschikbare budget in 2010 is €621 000. De structuur van het KBWOT programma is identiek aan dat van 2009. Het geld wordt besteed aan projecten, die hier wordt beschreven. De projecten zijn verdeeld in vier onderzoek prioriteitsgebieden: A) De invloed van veranderingen in het milieu op mariene ecosystemen, B) het effect van de visserij op ecosystemen, C) veranderingen in het beheer van de visserij en D) onderhoud en internationale uitwisseling van sleutelexpertise. Elk van deze gebieden vallen onder de bredere WUR kennisbasisthema's.

2 Introduction

The LNV programme WOT-05[1] Visserijonderzoek deals with the statutory tasks which The Netherlands is obliged to carry out in the area of fisheries (advice and science). Most of the obligations stem from international agreements to which The Netherlands is a signatory. The statutory tasks in fisheries are carried out by the Centre of Fisheries Research (CVO) which exploits the resources and expertise from the Institute of Marine Resources and Ecosystem Studies (IMARES)[2]. In order to maintain the infrastructure required to carry out these tasks, and to help anticipate future strategic needs through innovation, a separate programme within IMARES has been established (Kennisbasis WOT). The programme is part of the larger Kennisbasis programme carried out by Wageningen UR and has been developed in consultation with the Ministry of Agriculture, Nature and Food Quality (LNV). LNV provides the financial support for the programme and advises on the strategic vision.

The Kennisbasis WOT programme (supporting knowledge) has an active policy of underpinning the key-expertise required to carry out the statutory tasks, and of encouraging the further development the expertise needed to complete those tasks. The development and maintenance of this knowledge and expertise base is an integral part of the IMARES plan.
The investment in development and training is necessary to cope with the demands of both the research market in the future and the statutory obligations of The Netherlands.

The integration of and investment in the key expertise required by CVO into the knowledge base of a research organisation is important. In the past, knowledge gaps arose between what expertise was required by CVO and what was available. The requirements of LNV change regularly, thus development and innovation is crucial to the ability of CVO to provide the needed expertise and knowledge to address current and future strategic issues. In 2010 resources were prioritised towards number of specific themes and research areas that were felt to be underdeveloped within IMARES but required by the WOT programme.

This document describes the strategic framework for the support of the knowledge base and the development of key expertise for the WOT programme. As the structure of the 2010 programme is similar to 2009, this report is also similar to the report for the 2009 programme.

[1] previously listed as WOT programme 406

[2] IMARES was established in 2006 and consists of the former Nederlands Instituut voor Visserijonderzoek (RIVO) and parts of Alterra and TNO.

3. How KB WOT fits into the broader spectrum of research

Within DLO, kennisbasis is classified in nine themes. The kennisbasis for the WOT related to fisheries is in theme 1: "*Multifunctioneel gebruik van de groene en blauwe ruimte*" which translates to the multifunctional use of the green and blue space. The core areas of this theme are sustainable development, flexibility and regional decision making. Sustainable development covers both the maintenance of fisheries as well as the marine resources they exploit. The response of fisheries and managers to changes in fish populations and the dynamics of the environment which impact on those fish make flexibility a core area of the kennisbasis. With the development of fleet based data collection (under the EU data collection regulation) and the role of the regional advisory bodies the KB WOT programme must also consider the relevant scales of regionalisation.

The fishery WOT tasks cover the advice and actions required to support the national and European fishery policy. They cover commitments to the CFP (Common Fisheries Policy), national freshwater policy, the Habitats Directive and the Water Quality Directive where relevant to fisheries. The tasks include the collection of information and data, the development of understanding and the provision of evidence based advice. It is necessary to anticipate the future needs of LNV and the EU when developing the structure of the WOT kennisbasis programme. The current programme anticipates the following issues to be of importance to policy and statutory requirements: rebuilding of depleted resources, assessing resource exploitation (current and future), limiting and assessing the damage to habitat, protection of biodiversity, changes in trophodynamics of the marine ecosystem and environmental change.

Importantly for the kennisbasis programme in 2010, the EU is attempting to move towards a gradual implementation of the ecosystem considerations into fishery management and the next reform of the CFP. This is also true for the national policy. Thus KB WOT 2010 must respond to these needs.

When using science to advise policy, such as in fisheries management, it is necessary that the advice is based on credible and independent research of high scientific standards. This requires peer review of the science. Scientists must be aware of recent trends across the world in their research fields, any new developments in methodologies and must be internationally credible themselves. Thus Kennisbasis money could also be used to support technology exchange and scientific communication with scientists and institutes outside the Netherlands too. In addition, staff swaps with other institutes are encouraged.

4. The role of KB WOT

In a practical sense the KB WOT resources are used:

a. to innovate, develop and expand the knowledge in the research areas covering the priority policy areas (mentioned above)
b. to maintain and underpin key expertise to carry out the WOT programme and improve the efficiency of carrying out the tasks
c. to maintain/enforce the scientific reputation of the research organisation carrying out the statutory tasks and build international links
d. to add research value via co-finance initiatives

These resources are spread between fishery dynamics, fish biology, sampling strategies, populations, ecology and management systems (simulations and advice).

To ensure that the statutory tasks (WOT) can be carried out, core competencies should be maintained and supported by both experience and ability. To ensure continuity and maintain quality, the experience and technical ability should be spread across a number of personnel. Flexibility must be maintained by a research organisation to allow expertise to adjust as required to improve quality, efficiency or renewal. The ability and experience base is also important to ensure the maintenance of IMARES as successful contract research organisation.

Expertise can be maintained by the internal or external training of personnel; active participation in projects in which expertise can be transferred or developed and participation in relevant working groups. Also in house expertise can be developed by attracting into new staff with specific abilities and experience that complements the existing knowledge base.

To maintain the WOT programme, key expertise is required in surveying, advice, fish biology, data management and understanding the dynamics of fish populations, the fishing fleets and the ecosystem (Table 1). At present expertise is underdeveloped in areas such as acoustic surveying, sampling and advising on eel, database operation and management, the science and advice on biodiversity in the sea and spatial analysis.

Table 1. Key expertise held by IMARES and required for the WOT fisheries programme.

Key expertise for WOT Fisheries	
Surveying/Monitoring	**Advice**
Trawl	Drafting Advice
Benthos/shellfish surveys	Management strategy evaluation
Acoustic	Answering questions from managers & industry
Ichthyoplankton (fish eggs and larvae)	Communicating advice and certainty
Glass eel and eel	Providing information for catch options
Fresh water fish	**Data management**
Discards/ bycatch of cetaceans	Data acquisition
Market sampling	Data quality and precision
Recreational fisheries	Data storage
Biology	Data retrieval
Age determination	Fisheries statistics
Fecundity/maturity processes & estimation	**Fisheries dynamics**
Migration and distribution	Fleet structure and behaviour
Growth/survival	Analysis of VMS and logbooks
Trophic Interactions	Gear and technology issues
Fish ecology/Life history traits	Mixed fisheries selectivity
Recruitment	**Ecosystem dynamics/approach**
Stock structure/demographics	Ecosystem resilience
Population dynamics	Changes in carrying capacity/productivity
Stock assessments (age based models)	Multispecies interactions
Length based models	Spatial analysis and connectivity
Dynamics of data poor populations/stocks	Biodiversity
Coping with variability and uncertainty	Impacts of Fisheries
Interpreting MSY	Invasive species
	Habitat modelling

It is crucial for the provision of robust science that the research be cutting edge and innovative. LNV requires advice and services that can stand international scrutiny and also be forward looking. Therefore innovation is an important core component of the KB WOT programme. For the maintenance of the scientific reputation of IMARES and for quality control of the research; scientific, peer reviewed, publications are essential. A small part of the KB-WOT budget will be used for stimulating publishing of research which supported the WOT programme. Also a small part of the budget is reserved for exchange of scientists with scientific institutes abroad.

It is of course important to take available resources into account whilst trying to realise the ambitions of the WOT programme. This means that the needs of WOT must be prioritised and occasionally strategic decisions need to be made. If an expertise is lacking from the core scientists at IMARES and is only required for a short period, the relevant expertise can be hired in from outside.

5. Research priorities for 2010

The research priorities for 2010 are based on the perceived needs of the WOT programme (Table 2). Within these research priority areas, the maintenance of key expertise necessary to WOT takes priority, followed by the development and innovation required for future WOT work, then part of the available resources can be used for added research value via co-financing of other funding sources (providing projects are considered within those of the WOT 5 programme).

Table 2. Overview of research priority areas and approximate budget allocations.

	priority research area	**indicative budget in k€**
A	influence of changes in the environment on marine ecosystems	108
B	impact of the fishery on ecosystems	110
C	changing fishery management	202
D	maintenance and international exchange of key WOT expertise	201
Total		621

As the KB WOT programme looks forward, these priority research areas are likely to adapt and change to respond to the future needs of the WOT programme for fisheries. The development of a more ecosystem based management of the aquatic environment, the exploitation of shared space and managing complexity are likely to impact of the research and advice needs for fisheries. In particular how the proposed move to MSY management of fisheries (Maximum Sustainable Yield) is going to challenge research needs especially when considering MSY in dynamics ecosystems. A workshop is planned for April 2010 to look into the future research priorities for LNV and fisheries advice. Interviews with key managers in LNV will also take place in the spring of 2010. This workshop and the interviews will inform decisions about further development of the programme.

Priority area A: "Influence of changes in the environment on marine ecosystems"

The productivity of the sea changes over a range of temporal scales. These changes interact with anthropogenic pressure to make the fisheries system dynamic and sometimes unpredictable. There have been many recent, well documented, changes in the aquatic ecosystems, some are inter-annual variability and some are trends over time. Different parts of an ecosystem can become stronger or weaker with time (e.g. a move from demersal to pelagic production of fish in the North Sea). Some of these changes reflect regular cycles (e.g. salt waters flows into the Baltic, or the Atlantic Multidecadal Oscillation) whereas others are trends associated with longer term change. Some of these changes have been attributed to climate change. An understanding of the cause, variability and magnitude of change is important for a manager. This understanding will allow a proper assessment of risk, an analysis of the probability of stock recovery (or what is over exploitation), and hopefully to distinguish between anthropogenic and non-anthropogenic effects on the ecosystem.

The role of ecosystem variability and change within the provision of fisheries advice is expected to increase. This has been specifically mentioned as a goal by ICES[1]. There is a need to build up expertise in this field; hence the budget allocation for this priority research area is expected to remain similar into the near future. The research will also contribute to the scientific status of IMARES and to our quality control through peer reviewed publications.

Priority area B: "Impact of the fishery on the ecosystem"

Priority Area A dealt with the influence of natural factors on the marine ecosystems. Priority Area B deals with the human impact on the ecosystem, in particular what society now views as the undesirable side effects of fishing. IMARES, in recent years, has developed a significant amount of knowledge in this area. However there is still a need for further knowledge to assist managers. In 2010, EU legislation will oblige Member States to establish a programme to monitor a number of elements in the ecosystem which are sensitive to fishing. Also EU legislation is under development to reduce the amount of discarding. Resources from kennisbasis have been used to prepare for this international obligation. As this is a wide research area, projects will be carefully selected to address specific needs of the WOT programme. The research will also contribute to the scientific status of IMARES and to our quality control through peer reviewed publications.

Priority area C: "Changing Fishery management"

In many ways current fisheries management needs to change. The EU has recently progressed from the management of fish stocks to fisheries management. The EU, and national governments, are also expecting greater flexibility in the provision of advice and the terms in which the advice is given. The obligation for biological and economic data collection of fish and fisheries data by the Member States has been adjusted accordingly. The international advisory framework for fisheries is in a state of flux and is looking at new possibilities for managers, and

1 International Council of the Exploration of the Sea

this includes the management of fishing effort as well as catch. The Kennisbasis WOT resources will be used to develop new approaches to management and management models. Resources are also required for the development and adjustment of data collection, data storage and data access. The research will also contribute to the scientific status of IMARES and to our quality control through peer reviewed publications.

Priority area D: "maintenance and international exchange of key WOT expertise"

Further, kennisbasis resources will be put aside for the maintenance and quality control of the present expertise base and routine techniques and skills. IMARES needs to maintain core competencies. This covers age reading, stock assessments, acoustic techniques and data collection. Courses, workshops and exchanges are an important part of maintaining and developing core skills. The sharing and gaining of experience is a core part of the development of fisheries science within the EU, through study and working groups and workshops usually coordinated by ICES. These study groups also produce new innovative products and methods, thus it is crucial that those working for WOT remain active in these fora.

6. Management of the KB WOT programme

The structure of the programme is similar to that of the other DLO research programmes. The Kennisbasis programme consists of a number of approved, sometimes multi-annual projects. The programme is managed by a kennisbasis programme leader. The programme leader provides direction of the programme, controls the budgets, provides internal quarterly progress reports and an annual progress report. The programme leader is also responsible for reporting and resolving problems within the programme, and where necessary reporting issues to senior management. The annual progress report covers the allocation and spend of resources and documents the projects funded and the deliverables produced.

The projects, in the Kennisbasis WOT programme, are coordinated by project leaders. They are responsible for the planning and execution of the project, similar to other projects managed through IMARES. Each quarter, the project leader supplies the programme leader with information on the progress of the project, both financial and in terms of promised deliverables. It is the responsibility of the project leader to report any problems (present or predicted) to the programme leader at the earliest opportunity.

In the situations where Kennisbasis WOT money has been made available for co-financing of EU projects, it is the responsibility of the project leader to use all of the Kennisbasis money during the appropriate year. Funds cannot be rolled over, and failure to spend the money in one year, does not automatically mean that the money can be spent in the following year. The programme leader will regularly review the expenditure throughout the financial year.

7. Financing

From 2004 onwards, a new framework was developed to carryout the research by DLO for the Ministry of Agriculture, Nature and Food Quality (LNV). There are three financial layers: kennisbasis (KB), statutory tasks (WOT) and policy supportive research (BO).

Long term agreements between DLO and LNV cover the WOT. Policy supportive research projects are directed to applied short term requests from managers and tend to last up to 2 years.

The development of expertise programme for 2010 was financed by the research budget reserved for the kennisbasis programme. At the evaluation of the WOT programmes in 2004, it was agreed to allocate an annual budget to these programmes thus enabling key expertise to be maintained or developed to carry out the WOT. The available budget in 2010 for WOT programme 5 "Wettelijke Taken Visserijonderzoek" is € 621 000. This budget was expanded with additional funds from research programmes (€290 000 extra).

The existing requests for kennisbasis WOT money in 2010 showed that the budget was already over subscribed.

8. Proposing and awarding projects

Applicants for Kennisbasis WOT resources must complete a project proposal form (Appendix 1). The form requests information on the motivation for the project, a project description, how the project fits into WOT Kennisbasis and IMARES Kennisbasis as a whole, the duration and cost of the project, added value and corporation with other projects, the risks associated with the project and the final products to be delivered.

The applications are evaluated by a Permission Team (PT) using a number of criteria (Table 3). The composition of the PT varies annually and consists of the Head CVO or their nominated alternate, and three scientists to be appointed by IMARES including the Kennisbasis programme manager. Each individual member of the Permission Team initially reviews and grades all proposals. The grades from each member of the permission team, for each project, are them viewed and this provides the basis for annual building of the programme and the funding decisions. This procedure ensures synergy between the expertise requirements of CVO and IMARES. The head of CVO is responsible to LNV for the execution of the programme and expenditure of the budget. Thus the head of CVO has use of the available resources and has the final say on whether a project is supported or not.

Table 3. Prioritised list of criteria used to evaluate proposals for support from the kennisbasis WOT programme.

1	Does the proposal invest in essential missing expertise?
2	Does the proposal fit into at least one of the research priority areas (see section 4)?
3	Have other sources of funding been explored, and is KB WOT the most appropriate funding source?
4	Does the proposal add value by providing connectivity between existing projects?
5	What is the risk of success or failure of the proposal?
6	Does the proposal contribute to the prestige of the research organisation?
7	Does the proposal contain novel ideas or techniques?
8	Is the proposal seen as value for money?
9	Does the proposed project leader have a successful track record of delivering projects on time, with good products within budget?

As the budget must be spent during each financial year, the utilisation of the annual budget must be monitored carefully. This one of the programme manager's roles. If an under spend is occurring, then projects which failed to be funded, as a result of their lower criteria rating may well be funded. Thus new projects can be initiated during the year.
For 2010, bids or over €820 000 were received by the Permission Team. The following projects and budgets for 2010 were approved (Table 4), and individual project applications are shown in Appendix 2.

Table 4. Projects funded by Kennisbasis WOT in 2010. (see appendix 2 for details).

	KBWOT 2010 funding	Available Budget € 621	Projected spend
	Title	lead scientist	
1	Is there exchange between salt water and fresh water populations of smelt?	Tulp	€ 27.5
2	Fishery independent assessments of pelagic fish	Damme	€ 46.8
3	Underpinning Acoustics	Fassler	€ 32.6
4	Fish aging-1	Bolle	€ 60.0
5	An Ecological Atlas of the fishes of the waters around the British Isles	Heessen	€ 25.0
6	Development of a light trap to monitor glass eel recruitment in the Netherlands	Graaf	€ 25.0
7	Long term demographic, phenotypic and genetic changes in European eel popul	Dekker	€ 20.0
8	The ecosystem consequences of spatial planning in the North Sea: the importan	Poos	€ 49.5
9	Forage Fish Interactions (FACTS)	Dickey-Collas	€ 23.5
10	Operationalisation of management advice on fisheries induced adaptive change	Poos	€ 42.0
11	Reproductive Biology and Management in Marine Fish (FRESH)	Dickey-Collas	€ 19.0
12	KB WOT International exchange	Dickey-Collas	€ 159.6
13	KB WOT Programme Management	Dickey-Collas	€ 19.1
14	The feasibility of detecting discarding of marketable plaice using currently availa	Bierman	€ 32.4
15	WKMSSPDF: Workshop on sexual maturity staging of sole, plaice, dab and flou	Damme	€ 39.0
	Agreed spend		**€ 621.0**

9. Co-operation

Many of the WOT tasks must be carried out in collaboration with research organisations from abroad. In particular the research at sea, the sampling of the catches, the development of methods and models and also the international advisory process itself. Thus it is evident that international cooperation is often required to develop the skills base to complete the WOT and maintain quality. All collaboration must conform to the aims and priorities of the WOT programme.

Examples of this cooperation include ICES working groups, swapping staff between institutes and a number of EU and international financed research programmes. The strength of this cooperation is that knowledge and technology transfers are carried out in a more cost effective manner with efficiencies of scale. It also reduces the risk of IMARES "*reinventing the wheel*" when dealing with novel requests and new situations.

Appendix 1. Format application form for KB WOT projects

Research priority Area:	
Title of project	
Number of project	
Project leader	
Participating partners	
Duration	
Broad description of the project	
Why should this be funded by KB WOT?	
How does this relate to the IMARES development plan*	
Products to be delivered?	
How is dissemination of findings being addressed?	
Proposed budget	
Is the appropriate capacity available?	
What other potential funding sources have been considered?	
What are the potential risks to the project's success?	

Appendix 2. Description of Proposals submitted to Kennisbasis WOT 2010 for funding.

Research priority Area:	A, B, C & D. With a case study mostly related to C.
Title of project	Implementation of genetic techniques in IMARES monitoring programs to improve policy consultancy.
Number of project	1
Project leader	Jeroen Jansen
Participating partners	Internal: Jeroen Jansen, Wilma Lewis, Joel Cuperus, Johan Craeymeerch, Emiel Brummelhuis, Andre Meijboom, Jack Perdon, Kees Goudswaard External: Pieternella Luttikhuizen, Henk van der Veer (NIOZ).
Duration	One year
Broad description of the project	In order to make responsible decisions for fishery permits, it becomes increasingly clear that knowledge on a populations' genetic identity can be important. Over the past two years several questions, relating to population genetics of shellfish, were asked to IMARES by the ministry of LNV and other governmental parties. These questions included the level of introgression of a southern mussel species in the Wadden Sea and Oosterschelde; the level of genetic erosion in the Cockle population of the Wadden Sea; the level of genetic variation in the Razorshell Clam population, etc.. Similar questions may be of interest for the fish stocks. Currently IMARES cannot answer these questions. We have too little knowledge and experience to apply genetic techniques to answer our research questions. IMARES has no ambition to develop its own genetic laboratory. NIOZ is currently developing a state-of-the-art genetic lab which already has a good track-record. Preliminary discussions between IMARES and NIOZ resulted in a shared interest to collaborate and develop applied genetic research. Collaboration between NIOZ and IMARES means that samples will be collected by IMARES, laboratory techniques will be carried out by NIOZ. Analysis, discussion and publication will be carried out together. We hereby propose to carry out a case study that will produce answers that are relevant to stock assessment and ecological research questions. The scientific problem of interest is that taxonomists of IMARES and other labs (NIOO and NIOZ) identify different species of Razoshell clams (Ensis) in our samples. This differentiation is based on morphological characteristics, and depending on the determination guide one shell may be identified as two different species. Moreover, shell characteristics are known to be rather plastic and often not useful to differentiate between closely related taxa. We propose to relate this morphological variation to genetic variation amongst individuals, by which we will answer the following questions: <u>are different genetic groups of Razorshell clams (species or sibling species) present in Dutch coastal waters, and can they be identified some of the morphological characters proposed in the literature?</u> The distribution of the genetic and morphological diversity of Razorshell clams will be related to samples collected in Denmark and Belgium as well. In order to study genetic variation at the scale of the Netherlands, hypervariable markers will be developed. In order to get started, funding is needed to for consumables and research hours. Samples will be collected during regular ongoing surveys. NIOZ agrees on 50% co-financing.
Why should this be funded by KB WOT?	In general, genetic techniques become increasingly important and abundant in marine research. To be able to use these techniques and to be able to understand what other researchers did, IMARES needs to learn (kennisbasis) about modern applied genetics, in order to consult the ministry of LNV (WOT) and the fisheries industry in a proper way.
How does this relate to the IMARES development plan*	Applied genetic research will open new fields of research and (inter)national collaborations that relate to marine production (use of resources; genetic improvement of species; disease control; etc.); nature conservation (shellfish transplants; genetic pollution; genetic erosion), climate change (predicting range shifts).
Products to be delivered?	Publication on the relation between morphological and genetic variation in an international peer reviewed journal. Report to the ministry of LNV in which the case study is presented and the use of applied genetics for policy consultancy is being discussed.
How is dissemination of findings being addressed?	Via the publications mentioned above.
Proposed budget	Research hours by scale: OASS 2 - 72 hrs (€75) = € 5.400 JONDZ - 152 hrs (€95) = € 14.440 SONDZ – 8 hrs (€133) = € 1.064 Additional Expenditure: DNA extractions € 1.000 Microsatellites € 25.000 AFLP's € 5.000 Third party (hours) € 15.000 Total cost: € 66.904
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	Co-financing by NIOZ
What are the potential risks to the project's success?	The project might fail to finish in time (31-dec-2010) due to collaboration with third parties. The project-based working relation between NIOZ and IMARES is, however, improving.

Not funded as outside KBWOT remit, needs to be considered within genetics work of IMARES as a whole.

Research priority Area:	A
Title of project	Is there exchange between salt water and fresh water populations of smelt?
Number of project	2
Project leader	Ingrid Tulp
Participating partners	Internal: Martin de Graaf, Marieke Keller, Erwin Winter
Duration	6 months
Broad description of the project	Background Smelt has different life histories. The migrating (anadromous) population used to be very common in the Zuiderzee before closure of the Afsluitdijk . Nowadays these smelt inhabit the coastal waters and Wadden Sea and can grow up to 25 cm. The anadromous smelt spawns in early spring in fresh water, preferably in running water in river mouths on firm surfaces and on shore banks with hard substrate. After the closure of IJsselmeer a part of the population became landlocked. They become mature after one year, stay smaller than the anadromous smelt and hardly ever grow older than 2 years. The smelt populations of IJsselmeer and Markermeer have been in severe decline since 1990. These declines have a large impact on the conservation of water birds (Habitat Richtlijn; Natura 2000) relying on smelt as their prey and the fishery both on smelt and on piscivorous fish relying on smelt. Several hypotheses have been formulated that could explain the decline of smelt. These include reduced primary and secondary production through changes in nutrient load, reduced feeding efficiency because of increased water transparency, increased summer mortality due to high temperatures and low oxygen concentrations, reduced reproduction caused by high metabolism combined with low food during warm winters, and various changes in the interactions between smelt and its main predator, pikeperch. To test these hypotheses will be the focus of the PhD work of Marieke Keller, who recently started her work at IMARES as part of the larger ANT-IJsselmeer funded by RWS. An important question that is not covered by the ANT project is the connectivity between the anadromous smelt and the landlocked smelt populations in IJsselmeer en Markermeer. What is the contribution of anadromous smelt to the total spawning biomass of smelt in IJsselmeer and Markermeer? Recently RWS (Kruitwagen & Klinge 2009) has investigated the possibilities of adjusting the management of the sluices in the Aflsluitdijk to improve the immigration of especially smelt and other diadromous fish species. Could the landlocked smelt stock be resupplied with the anadromous stock? It is of utmost importance to determine the current contribution of diadromous smelt to the total spawning biomass. With the use of microchemistry analyses (calcium and strontium) of otholiths we could investigate the origin of smelt collected at different places in IJsselmeer and Markermeer (Borcherding et al. 2008). Insight in the relative importance of the marine stock for the landlocked stock is crucial to understand the population dynamics. Proposed work and required budget Smelt will be collected in early spring during the spawning season as part of ongoing projects in IJsselmeer and Markermeer (at no extra costs). Microchemistry analyses can be carried out by a specialized lab. This will cost approximately 130€ per sample. IMARES has good experience with TNO-Zeist (food lab) for these sort of analyses. We plan to analyse ca 150 individuals from the Wadden Sea proper, and from several spawning sites throughout IJsselmeer and Markermeer. The aim is to find a masters student to carry out the sampling and statistical analyses and reporting. The required budget will therefore be limited to chemical analyses, transport costs and time for supervision. Borcherding J, Pickhardt C, Winter HV, Becker JS (2008) Migration history of North Sea houting (Coregonus oxyrinchus L.) caught in Lake IJsselmeer (The Netherlands) inferred from scale transects of Sr-88 : Ca-44 ratios. Aquatic Sciences 70:47-56 Kruitwagen,G., Klinge, M. (2009) Metingen visintrek Kornwerderzand bij schuttingen met spuisluizen. Rapport Witteveen+Bos in opdracht van Rijkswaterstaat Waterdienst.
Why should this be funded by KB WOT?	The small pelagic smelt plays a key role in the IJsselmeer/Markermeer ecosystem. It is the only small, numerous pelagic prey fish, and there are no other fish species present that can take over its ecological niche in the foodweb. Insight in the population dynamics and interaction between landlocked and anadromous smelt is crucial for the development of management options (e.g. ANT project) concerning both fisheries and the opening of sluice. Given its important role both in the IJsselmeer fisheries and in nature conservation (as food for birds and fish) we feel this topic deserves attention within KBWOT.

How does this relate to the IMARES development plan*	Theme: Climate Climate change, increased summer mortality due to high temperatures and low oxygen concentrations, has been suggested as one of the important factors responsible for the observed decline of smelt. If at present the contribution of anadromous smelt to IJsselmeer/Markermeer smelt is low, improved migration opportunities could provide a) refuge for landlocked smelt in the Wadden Sea during warm periods in IJsselmeer and/or b) increase/restock IJsselmeer population with anadromous smelt. Theme: Pressure on ecosystem The IJsselmeer is a priority area for aquatic birds (NATURE 2000). Smelt play a key role in the IJsselmeer ecosystem linking the zooplankton to piscivorous birds and fish. The recent decline of smelt is a serious threat to aquatic birds like terns and merganser.
Products to be delivered?	Paper in a refereed journal
How is dissemination of findings being addressed?	The findings will be communicated to stakeholders (managers, fishers, scientists) by (popular) scientific publications, a presentation at VIssennetwerk and if possible at a meeting with commercial smelt fishers.
Proposed budget	Research hours by scale: 80 OND (7440€) Additional Expenditure: 19.500€ Total cost: €_____27500_____
Is the appropriate capacity available?	yes
What other potential funding sources have been considered?	Collection of samples will be covered by the ANT Smelt PhD Project.
What are the potential risks to the project's success?	We feel this is a relatively low risk project. Only if the stock becomes so low that collection of samples is hampered, we will have difficulties meeting the goal of the project.

Funded

Research priority Area:	B
Title of project	Sampling Ensis directus in deep water
Number of project	3
Project leader	Kees Goudswaard
Participating partners	Internal: Jeroen Jansen, Arnold Bakker, Jack Perdon, Johan Craeymeersch External: non
Duration	Two months
Broad description of the project	There in an increasing need to do stock assessments for razor shell clams (*Ensis directus*), for this invasive species spreads quickly in Dutch, Belgium, German and Danish coastal waters. Assessing razor clam abundance is part of a growing number of IMARES projects: WOT mesheften; BO schelpdieretende vogels; Zee en kust onderzoek NWO; Mesheften voor de Belgische kust; compensatiemonitoring in Deense wateren, etc. Moreover, monitoring of this population is part of new research proposals as well as impact studies. In 2008 KB WOT funded research on our specific Ensis sampler, after which we were able to carry out part of the project work stated above. In addition, we demonstrated the incredible size of this stock. As a result, current shellfish research concentrates around this species. During our field surveys we experienced the limitations of our device. It turns out that sampling at greater depth >20m becomes rather complicated, unreliable and labour intensive, while personal safety of the person who manage the “unlock rope” is at risk. This is a large disadvantage since we have been asked to estimate our ability to sample for common otter shells (*Lutraria*) as well (see IMARES -WOT Ensis report (Goudswaard et al, 2009) on the development of this species in the coastal zone). Sand extraction for coastal maintenance is foreseen to take place in the zone below 20 meter and data collection on shellfish in this area is expected as it is adjacent to the Natura 2000 area’s. The zone is likely to be important in the Marine Water Frame Work Directive. This increases the importance of a proper working sampling device. Currently, two projects face failure because we simply can’t take samples with the desired accuracy. This has everything to do with the following technical aspect: After the device buries itself in the sediment, it must be unlocked. Currently we unlock with a second line (“unlock rope”) from the ship, but we must find a way to unlock remotely. We have two solutions to this problem: 1 Acoustic release 2 Mechanical release The first option is currently being explored. Technical solutions found so far turn out to be expensive and slow. The second option is thought through mechanical release. We believe that a mechanical release system (driven by a wheel that runs when it contacts the sea floor) is a robust and price efficient solution to our problem. This needs to be constructed and tested. Thus, the aim of this project is to make this specific sampling gear suitable for deeper water, by installing and testing a mechanical release system.
Why should this be funded by KB WOT?	It will improve a significant part of our current work on shellfish stock assessments - WOT projects - and we will keep our position as an attractive partner in inter(national) project groups.
How does this relate to the IMARES development plan*	The significance of *Ensis directus* population for fisheries and carrying capacity studies links this project to our topic on Marine Production. Moreover, rapidly growing stocks of both *Ensis* and *Lutraria* are believed to reflect the current warming of the North Sea. Thereby this project is also linked to our topic Climate Change Research and Delta research.
Products to be delivered?	Brief report on the technical improvements and sampling success of our Ensis sampler.
How is dissemination of findings being addressed?	The sampler is a unique apparatus only developed by IMARES. The findings will improve the sampler for which IMARES will get the credits as an innovative organisation. Dissemination of finding in this unpatented stage is not advisable.
Proposed budget	Research hours by scale: OASS 2 140 hrs (€ 73) = € 10.220 JONDZ 80 hrs (€ 93) = € 7.440 Additional Expenditure: PM Total cost: €17.660
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	In order to make the planned improvement, most of the projects outlined above contribute to this research. Shipping and construction work required is estimated at approximately € 25.000 and will be paid for by other projects.
What are the potential risks to the project’s success?	The system might fail due to unexpected technical difficulties. This can only be decided after the project has finished.

Not funded as recognised as important research field but need a better explain project

Research priority Area:	C
Title of project	Distribution and abundance of mackerel in the North Sea derived from acoustic data collected on alternative surveys
Number of project	4
Project leader	Sascha Fässler
Participating partners	Internal: Sascha Fässler External: Jeroen van der Kooij (CEFAS); Paul Fernandes (marine Scotland, formerly FRS)
Duration	10 weeks
Broad description of the project	During a meeting held in Bergen in April 2009 it was emphasized that the assessment of the currently abundant North-East Atlantic mackerel is dependent on a single fishery independent estimate of biomass, derived from the Egg Surveys. This is only available once every three years and makes assessment increasingly inaccurate. Various research surveys, such as the IBTS, have verified that there is an even wider distribution of mackerel than that indicated by the commercial fisheries. Due to the pronounced changes in the distribution and migration pattern of mackerel observed recently (2006 and 2008) ICES WGWIDE encourages future surveys to collate additional information to monitor these changes. The project would make use of acoustic multifrequency species identification methods to characterize echotraces of mackerel from acoustic data collected on vessels participating in standard surveys. A species identification algorithm developed in the acoustic post-processing software Echoview will be fine-tuned using ground-truthed data from acoustic surveys for mackerel conducted in the northern North Sea before 2004 by the FRS Marine Laboratory. The algorithm will then be used to extract mackerel schools from acoustic data collected during the CEFAS North Sea Q3 IBTS 2007-09 and the Scottish and Dutch components of the North Sea herring surveys conducted in July.
Why should this be funded by KB WOT?	The project will provide answers to tackle a current problem that is highly relevant to ICES and ultimately IMARES strategies. To accomplish the move away from single species management, surveys will need to become 'ecosystem surveys' with a more holistic sample strategy where alternative data is collected as well. The methodology of the project links in nicely to this approach. Apart from providing valuable surplus information to potentially assist fishery management and survey design, the project would also touch on other KBWOT research priority areas. Changes in distribution and abundance of North-East Atlantic mackerel are hypothesised to be linked to climatic variation and abundance of prey species. Investigation into migration and abundance of mackerel will ultimately also give answers in relation to priority area A. Additionally, collaboration with the two institutes in the UK will foster future work relationships and may attract further project opportunities.
How does this relate to the IMARES development plan*	The project covers all the four topics of the IMARES development plan. Changes in temporal mackerel distribution could be compared directly to environmental and climate parameters in particular. Answers could be given to questions in relation to how the abundant mackerel population may affect the whole ecosystem and why there are that many in the first place. Results could be partly used to shape marine policy with regards to alternative quota allocations of a stock that has seen marked shifts in abundance and biomass levels. However, the underlining topic of the project has to be sustainable marine resource management. Additional data on mackerel distribution and abundance will invariably assist fisheries management and provide knowledge about collection of additional complementary data during standard surveys in line with the move to 'ecosystem surveys'.
Products to be delivered?	- Improved, robust mackerel identification algorithm that could be "trained" with additional data and used for future investigations. - Distribution maps of mackerel in the North Sea in late summer for the period 2007-2009
How is dissemination of findings being addressed?	Project results will be disseminated in the primary scientific literature. One paper addressing the algorithm to identify mackerel echotraces, and another one covering distribution, abundance and behaviour of mackerel in the North Sea between 2007-2009.
Proposed budget	Research hours by scale: 250 (scale 10) Additional Expenditure: travel costs (€ 1'000,00) Total cost: € 24'250,00_____
Is the appropriate capacity available?	
What other potential funding sources have been considered?	-
What are the potential risks to the project's success?	All the data has been collected already and most of the work involved post-processing and analysis. The only potential risk to success would be unforeseeable unavailability of staff or loss of data.

Not funded as individual project but joined with projects 9 and 10.

Research priority Area:	D
Title of project	Underpinning Acoustics
Number of project	5
Project leader	Sascha Fässler
Participating partners	Internal: Peter van der Kamp External:
Duration	1 year
Broad description of the project	The project will target the maintenance and development of the acoustic expertise at IMARES. Analysis mechanisms will be automated as far as possible to achieve objectivity within the assessment process. Methods to implement exported acoustic data into Frisbe – which are still non-existent today, but vital if the data are to be used for further research – will be developed. Acoustic backscatter models will be rewritten in a programming language that can be read by software available at IMARES (SAS, or free ones like R or Octave). Effort will be put into building and maintaining links with other institutes in order to enhance acoustics research output and develop current methodologies. Further, the ICES WGFAST meeting will be attended to learn about the most current global developments in fisheries acoustics research. Additionally, alternative ways of enhancing and applying the current inventory (hardware (e.g. upside-down towed body, DIDSON) and software (e.g. EchoView)) will be explored. In line with the ongoing shift in survey focus towards a more holistic 'ecosystem survey', attempts will be made to collect acoustic data on alternative surveys and to use the acoustic survey time series to provide answers to research questions that are not related to stock assessment.
Why should this be funded by KB WOT?	Through automated analysis mechanisms, output data from acoustic surveys can be produced more easily and quickly in the correct format to be implemented into the IMARES database Frisbe and other databases such as the ICES FishFrame. Implementation of exported acoustic data into Frisbe will aid a whole range of future in-house research as the data will be easily available in a comprehensible format (basically, acoustic energy per species per area – convertible into biomass/abundance of species per area). Once in a usable format, backscattering models will be vital for future research and analysis of acoustic data. To maintain the core competency of acoustics, the aforementioned work needs to be undertaken to keep the methods at the most current state and explore alternative ways to assist in-house research.
How does this relate to the IMARES development plan*	Acoustic techniques were identified among the most promising to meet the scientific challenges faced by the implementation of ecosystem based fisheries management. Combined with other oceanographic tools and appropriate models, acoustics can provide information about changes in spatial and temporal species distribution, abundance and biomass – the prime input parameters of ecosystem models. The data are a vital contribution to research covering the topics of the IMARES development plan (e.g. how does climate affect the observed species distributions? What are the drivers of the observed changes in species biomass? How can the stocks be exploited sustainably given the observed species numbers/biomass?). In order to maintain the quality of the information provided by acoustics, it is important to invest into the development of the methods and explore alternative ways of usage.
Products to be delivered?	- Automated method to analyse data from standard acoustic surveys - Implementation method for acoustic data into the MARES Frisbe database - Acoustic backscattering model code in SAS or another freely available software like R or Octave (a Matlab clone)
How is dissemination of findings being addressed?	Internal reports and primary scientific literature
Proposed budget	Research hours by scale: 1 x 350 (scale 10) & 1 x 100 (scale 10) Additional Expenditure: Total cost: € 32'550,00_____
Is the appropriate capacity available?	
What other potential funding sources have been considered?	-
What are the potential risks to the project's success?	No specific risks other than unexpected unavailability of staff.

Funded.

Research priority Area:	D
Title of project	Fish aging
Number of project	6
Project leader	Loes Bolle
Participating partners	Internal: age readers (# 12) External: ICES institutes (through PGCCDBS)
Duration	Jan – Dec 2010
Broad description of the project	The following three aspects of age reading are essential for the maintenance of this key expertise within IMARES • Training of new age readers • International calibration: participation in international (mainly PGCCDBS coordinated) exchanges and workshops • Development and maintenance of QA procedures within IMARES With a limited budget (€50.000) only the international calibrations can be carried out
Why should this be funded by KB WOT?	The above described aspects of age reading are not covered by WOT funding for routine tasks (i.e. market sampling, surveys) and have therefore been covered by KB-WOT funding since 2004
How does this relate to the IMARES development plan*	Almost all population dynamic research carried by IMARES is age structured. Hence the maintenance and development of the key expertise "fish ageing" is important in all 4 themes of the IMARES development plan.
Products to be delivered?	ICES reports of exchanges and workshops: - plaice exchange & workshop (NL coordinated) - dab exchange & workshop (DE coordinated) - blue whiting exchange & workshop (NO coordinated) - cod exchange (NO coordinated) - sole exchange (UK coordinated) - brill exchange (BE coordinated) - mackerel workshop? (follow-up on exchange in 2009?) - haddock workshop? (follow-up on exchange in 2009?)
How is dissemination of findings being addressed?	ICES reports of international exchanges and workshops are disseminated through PGCCDBS
Proposed budget	Research hours by scale: OASS1: 116 hours = €6,960 OASS2: 340 hours = €25,500 JONDZ: 114 hours = €10,830 Additional Expenditure: travel = €6,000 materials = €710 Total cost: €50,000
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	WOT Surveys & WOT Market sampling
What are the potential risks to the project's success?	Insufficient prioritisation within institute.

Funded with €60 000

Research priority Area:	D
Title of project	Fish aging
Number of project	7
Project leader	Loes Bolle
Participating partners	Internal: age readers (# 12) External: ICES institutes (through PGCCDBS)
Duration	Jan – Dec 2010
Broad description of the project	The following three aspects of age reading are essential for the maintenance of this key expertise within IMARES • Training of new age readers • International calibration: participation in international (mainly PGCCDBS coordinated) exchanges and workshops • Development and maintenance of QA procedures within IMARES
Why should this be funded by KB WOT?	The above described aspects of age reading are not covered by WOT funding for routine tasks (i.e. market sampling, surveys) and have therefore been covered by KB-WOT funding since 2004
How does this relate to the IMARES development plan*	Almost all population dynamic research carried by IMARES is age structured. Hence the maintenance and development of the key expertise "fish ageing" is important in all 4 themes of the IMARES development plan.
Products to be delivered?	ICES reports of exchanges and workshops: - plaice exchange & workshop (NL coordinated) - dab exchange & workshop (DE coordinated) - blue whiting exchange & workshop (NO coordinated) - cod exchange (NO coordinated) - sole exchange (UK coordinated) - brill exchange (BE coordinated) - mackerel workshop? (follow-up on exchange in 2009?) - haddock workshop? (follow-up on exchange in 2009?) IMARES manuals: - part I: ageing procedures - part II: back-calculation procedures - part III: quality controls
How is dissemination of findings being addressed?	ICES reports of international exchanges and workshops are disseminated through PGCCDBS
Proposed budget	Research hours by scale: OASS1: 294 hours = €17,640 OASS2: 474 hours = €35,550 JONDZ: 154 hours = €14,630 Additional Expenditure: travel = €6,000 materials = €680 Total cost: €74,500
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	WOT Surveys & WOT Market sampling
What are the potential risks to the project's success?	Insufficient prioritisation within institute.

Not funded as previous bid was funded.

Research priority Area:	A B
Title of project	The interaction between pollution and fisheries and the relation with fish recruitment success. Modelling population dynamics and management.
Number of project	08
Project leader	Reinier Hille Ris Lambers
Participating partners	Internal: Reinier Hille Ris Lambers, Tobias van Kooten, Edwin Foekema Tinka Murk External: Wolf Mooij (NIOO)
Duration	
Broad description of the project	Within the EU project MODELKEY, IMARES assessed that through bioaccumulation the levels of pollutants in a female fish can reach values that reduce the survival rate of offspring substantially. The current levels of dioxins, PCBs and brominated flame retardants in sole from the Westerschelde for instance can be held responsible for around 25% mortality of the offspring. The question to be answered in the proposed project is if this pollution related mortality has an effect on the recruitment success of a fish population and how this relates to other stress factors such as fishing pressure. It is hypothesised that a relatively unexploited fish population produces such a surplus of eggs and larva, that the presence of toxicity induced mortality of offspring is easily compensated by density dependent processes, and will thus not be noticed. If however the population is overexploited, this compensation potential might be much lower, and toxicity induced mortality might add to the poor recovery potential of the population. In this project we initially examine this hypothesis, by modifying existing structured population models developed within IMARES to account for toxic effects, possibly by incorporating relevant Dynamic energy budget formulations for toxicity (DEBTox). By setting out the combined impact of toxicity related mortality and fishery pressure in various scenarios we will evaluate the effect of the relative pressures of toxicity and fishing pressure on fish population dynamics, with particular reference to transitions between low abundance and high abundance states, extinction thresholds and fisheries yield. Based on the results of this modelling exercise these results will be 1) used to raise funds for further research on this topic. 2) result in a manuscript, 3) will be a part of the PhD thesis of Edwin Foekema We will also aim to involve MSc. students to carry out part of the research and modelling.
Why should this be funded by KB WOT?	This project can be considered as a pilot study on a subject with a large potential for further research. Early stage development of knowledge on the interactions between toxicity and fisheries mortality is important, so as to be ready for future queries for advice from fisheries managers. In addition, this subject has a high potential for publication. This is the first time that the interactions between pollution and fisheries are investigated by combining the specific expertise of two IMARES departments, the department of Toxicology from the Wageningen University and the Netherlands Institute for Ecological Research (NIOO)
How does this relate to the IMARES development plan*	By linking both toxicity and fish dynamics, The outcome of this project is relevant for at least two of the four themes of the IMARES development plan: 1. pressure on the ecosystem 2. sustainable marine production Depending on the outcome it could also be of relevance for the 'Marine policy theme'
Products to be delivered?	A manuscript intended for scientific publication
How is dissemination of findings being addressed?	Besides the preparation of the scientific paper, the results will be presented at various platforms for scientist, water managers and stakeholders
Proposed budget	Research hours by scale: 160 hours JONDZ adaptation and development of model =16000 160 hours JONDZ paper writing and conference. =16000 40 hours JONDZ student guidance =4000 Additional Expenditure: 2000 euros publication costs (open access) 4000 euros presentation at international conferences Total cost: €_42000
Is the appropriate capacity available?	Yes, both population dynamic and toxicological expertise are available.
What other potential funding sources have been considered?	No other funds are available. KBWOT is the most appropriate source of funding: this project develops knowledge to link fish population dynamics and toxicological effects, and is forward thinking in this respect. Results of this project will also be used to apply for new funds.
What are the potential risks to the project's success?	Planning student involvement is always difficult, however a suitable student has already been found by the dept. of Toxicology.

Not funded as proposal seen as vague and lacked specifics.

Research priority Area:	B
Title of project	Determining the spawning origin of herring by using morphometric shape discrimination of embedded otoliths
Number of project	9
Project leader	Harriet van Overzee
Participating partners	Internal: Ineke Pennock, Silja Tribuhl, Stijn Bierman, Cindy van Damme, Harriet van Overzee, Mark Dickey-Collas External: Audrey Geffen, Lotte Clausen
Duration	320 hours
Broad description of the project	North Sea herring (*Clupea harengus*) is a pelagic species that consists of a complex mixture of subcomponents. Each subcomponent has its own spawning ground to which it returns to during the spawning season. DTU Aqua has developed a method to determine the spawning origin of herring by using morphometric shape discrimination of otoliths. We learned this technique within the NORDIS project. It involves taking a photograph of the complete "free" otolith and importing it to a software programme where a shape analysis routine is run. This results in a list of Fourier descriptors that can be used for statistical analysis. In the NORDIS project this technique has been used to determine the spawning origin of herring samples that were caught in the Norwegian Sea. The results showed that we can distinguish Norwegian Spring spawners from autumn and winter spawning herring. During the NORDIS project we also briefly examined whether it is possible to apply the technique of morphometric shape discrimination on embedded otoliths. Preliminary results indicate that this is possible. We propose a study where we further analyse the possibility of using the technique of morphometric shape discrimination on embedded otoliths. We will apply this technique on samples that were taken during the NORDIS project and by Bierman *et al*. (submitted). The spawning origin of these samples has already been determined, either by morphometric shape discrimination of “free” otoliths or using the pattern in the microstructure of the otolith core. Subsequently we will statistically analyse the results. Ultimately, this study will result in a standard protocol that can be used to determine the spawning origin of herring samples (e.g. herring otoliths that are stored at IMARES). References Bierman, S.M., M. Dickey-Collas, C.J.G. van Damme, H.M.J. van Overzee, M.G. Pennock-Vos, S.V. Tribuhl & L.A.W. Clausen, submitted. Between-year variability in the mixing of North Sea herring spawning components leads to pronounced variation in the composition of the catch.
Why should this be funded by KB WOT?	This research will result in a protocol that can be used on embedded herring otoliths stored at IMARES.
How does this relate to the IMARES development plan*	This project will provide a better understanding of the spawning origin of herring in samples from catches. Such knowledge will be of value to the IMARES research themes pressure on the ecosystem and sustainable marine production.
Products to be delivered?	A protocol in determining spawning origin of herring by morphometric shape discrimination of embedded otoliths.
How is dissemination of findings being addressed?	Report that presents the work that has been done.
Proposed budget	Research hours by scale: 7-9: 200 hours 10-11: 100 hours 13-14: 20 hours Additional Expenditure: - Total cost: € 25.780,-_____
Is the appropriate capacity available?	At the moment it is uncertain whether Ineke and Silja will have time to work on this project in 2010. We therefore propose that this project runs for two years.
What other potential funding sources have been considered?	None
What are the potential risks to the project’s success?	None

Not funded as individual project but joined with projects 4 and 10.

Research priority Area:	B, C, D
Title of project	Horse mackerel modified DEPM
Number of project	10
Project leader	Cindy van Damme
Participating partners	Internal: External: Olav Kjesbu, IMR, Norway and Peter Witthames, former CEFAS, England
Duration	1 January till 31 December
Broad description of the project	For many years a tri-ennial international Mackerel and Horse mackerel egg survey in the Northeast Atlantic has been conducted. Horse mackerel is an indeterminate spawner, eggs are still developed during the spawning season, and it is therefore not possible to estimate total fecundity. The tri-ennial egg survey is designed to use the Total Annual Egg Production Method (TAEP) for mackerel. For the TAEP it is necessary to estimate total fecundity. Since this is not possible for horse mackerel, the horse mackerel egg production data from the tri-ennial survey can only be used as an index. The Daily Egg Production Method (DEPM) can be used for indeterminate spawners, such as horse mackerel, to estimate SSB. For the DEPM it is necessary to sample eggs and adult horse mackerel at spawning at high intensity. The design of the tri-ennial survey does not allow for intensive sampling of the adults and thus the actual catch of spawning adults has not been possible. Thus, the traditional DEPM can not be used to estimate horse mackerel SSB. In this project we will investigate the possibility to modify the traditional DEPM method using the data collected during the 2007 survey. If the modified DEPM method can be used to estimate horse mackerel SSB it will be used to estimate horse mackerel SSB from the data collected during the 2010 survey as well. For the DEPM method batch fecundity, spawning fraction and ratio male/female. Batch fecundity can be estimated from the 2007 whole mount fecundity samples, even though females are not yet spawning, but the batches are already clearly separated. The spawning fraction and ratio will be estimated from the fish that have fully developed oocytes but are not yet hydrated, indicating they will spawn soon.
Why should this be funded by KB WOT?	IMARES participates in the tri-ennial mackerel and horse mackerel survey for many years but it has not been possible to estimate horse mackerel SSB so far from the data from this survey. An SSB estimate would improve the ICES advice on the horse mackerel stock.
How does this relate to the IMARES development plan*	A reliable SSB estimate would improve the possibilities for better and sustainable management of an important pelagic fish species.
Products to be delivered?	The results will be published in a peer reviewed paper and ICES WGMEGS report.
How is dissemination of findings being addressed?	Presentation at the FRESH/ICES workshop on Egg Production Methods in 2010 and peer reviewed paper.
Proposed budget	Research hours by scale: 100 junior researcher Additional Expenditure: None Total cost: €__9500
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	No other funding is available.
What are the potential risks to the project's success?	No potential risks, data is available from the 2007 survey and Olav Kjesbu and Peter Witthames have knowledge of using the DEPM method for other fish species.

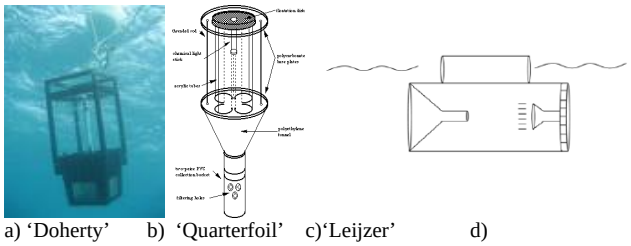
Not funded as individual project but joined with projects 4 and 9.

Research priority Area:	B
Title of project	Collecting basic data on Otter shells (*Lutraria lutraria*)
Number of project	11
Project leader	Kees Goudswaard
Participating partners	Internal: Jeroen Jansen, Johan Craeymeersch, Rob Witbaard & Jack Perdon External: Owner and crew of shellfish fishing vessel
Duration	Four months
Broad description of the project	Otter shells (*Lutraria lutraria*) are shellfish which were found in low densities before 2002 in the deep waters of the North sea. Since 2002 when the first 2 individuals were found in the coastal zone of The Netherlands the species has increased to billions as found in the annual coastal shellfish survey which is executed by IMARES for the WOT shellfish programme. In this survey, which focuses on *Ensis* (mesheften) and *Spisula* (strandschelpen), only parts of the siphon are found on which the species is identified. Intact specimen are rare as the shell is fragile and the species is deep buried in the sediment. Specimen from boxcores and Ensis grab are often damaged due to these fragile shells. With the increase, as described in Goudswaard et al. (2008 and 2009) also commercial interested has started and in the end of 2009 one commercial vessel has started experimental fishing on these unexploited shellfish stock. Due to the type of fishing in deep sediment this vessel (WR74) is able to fish quite a number of intact specimen. This offers the opportunity to collect lacking information on biometric data and stock composition. The owner and crew of the vessel are cooperative to receive IMARES on board of their vessel and to facilitate research on the species. As the species is a moneywise a valuable item in the shellfish market a development of a small fisheries for some vessels might be possible in a now still unregulated and open access fisheries. Available intact shell material of which size, total biomass weight, shell/meat weight will be known and will be analysed at the laboratory with coupe techniques which were also applied on *Arctica islandica* (Noordkromp). This technique might give evidence to annual cohort analysis of the whole otter shell stock.
Why should this be funded by KB WOT?	Biometric data will fill a gap in knowledge and will enable to provide proper data concerning the biomass of *Lutraria lutraria* in our annual WOT report on the costal shellfish stocks (Goudswaard et al 2008,2009). Providing basic data will keep our position as an attractive partner in inter(national) project groups.
How does this relate to the IMARES development plan*	The area and habitat expansion of Otter shells might be the result of marine global warming in the waters of the North sea. Usually this is demonstrated on invasive fish species from the south. Otter shells might be a good example species due to its abundance and indigenous origin of shellfish. The IMARES development plans has Climate Change Research as one of its objectives and this proposal fits in this objective
Products to be delivered?	Basic data on biometrics, species composition and distribution of Otter shells. Basic data on additional species in the catch, discards and bycatch.
How is dissemination of findings being addressed?	The results of this research are likely to provide sufficient data for a scientific publication in a double refereed journal.
Proposed budget	Research hours by scale: OASS 2 - 112 hrs (€73) = € 8.176 JONDZ - 160 hrs (€93) = € 14.800 SONDZ – 40 hrs (€133) = € 5.320 Additional Expenditure: € 1.700 Total cost: € 29.996
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	This specific project is additional to the existing programmes under execution (WOT shellfish) which are already limited and under budget pressure.
What are the potential risks to the project's success?	The project might fail due to unexpected stock collapse or closure of the unregulated fishery for this shellfish species. In such a case the major budget might remain untouched and remains available.

Not funded as project seen not related to longer term KBWOT goals.

Research priority Area:	A B D
Title of project	An Ecological Atlas of the fishes of the waters around the British Isles
Number of project	12
Project leader	Henk Heessen
Participating partners	Internal: Henk Heessen, Remment ter Hofstede and a jr. biologist External: Jim Ellis (CEFAS), Niels Daan (ex IMARES)
Duration	2.5 years (funding is asked for 2 years)
Broad description of the project	Production of an ecological fish atlas, based on survey data, focussing on the North Sea, but including waters around the British Isles, plus the Baltic (as far as data are available in DATRAS format). The set-up would be similar to the pdf's as produced for the ICES-FishMap website. All ± 200 species encountered in the surveys will be included.
Why should this be funded by KB WOT?	The data to be used are mainly collected during EC funded, and ICES-coordinated, surveys. The project would bring together the knowledge which is present in many people's heads and scattered over many publications. Furthermore it will integrate results of more than 30 years of fish surveys in the North Sea. The end product can be regarded as a standard work for people involved in fish ecology.
How does this relate to the IMARES development plan*	Already the Atlas published as CRR in 1993 was considered as a very valuable source of information for all those concerned with fisheries, the ecosystem, and changes in stocks due to e.g. climate change. As such, an ecological fish atlas, is important when studying the effects of changes in the environment on marine ecosystems (priority A), and the impact of the fisheries on the ecosystem (priority B). Furthermore, an atlas would be an important back ground document to be used to maintain key WOT expertise (priority D).
Products to be delivered?	A published book (and/or a website, but the problem with a website is that it would need maintenance)
How is dissemination of findings being addressed?	As soon as a manuscript is roughly available a publisher (ICES?) will be contacted, but publishing costs are not yet included in the proposal.
Proposed budget	Research hours by scale total project: SRO 720 (IMARES part) WO 1100 Niels Daan 560 *2010* *2011* Research hours by scale KBWOT part: SRO 175 170 WO 275 270 Additional Expenditure: miscell. 1150 € 1060 € Total cost: € 100,000 Proposal: € 50.000,- in 2010 and € 50.000,- in 2011.
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	The EC has been approached for funding but they claim that ICES receives enough budget from the Commission. The Ministries of LNV and V&W will be approached for altogether ± 100,000 €. For the publication of the book a publisher will be sought, starting with ICES. CEFAS will provide about 1220 hrs of the total of 3600 hrs planned. Niels Daan is planned to contribute about 560 hrs for free (only travel or additional costs to be funded)
What are the potential risks to the project's success?	A gross underestimation of the time needed. Niels Daan unable to contribute.

Funded with €25 000

Research priority Area:	A *B C* D
Title of project	Development of a light trap to monitor glass eel recruitment in the Netherlands
Number of project	13
Project leader	Martin de Graaf
Participating partners	Internal: de Graaf, van der Heul, Leijzer, Dijkman External:
Duration	1/1/2010 – 1/9/2010
Broad description of the project	Glass eel recruitment has been monitored at Den Oever since 1938 using a lift net. Due to the dramatic decline of glass eel recruitment, the annual lift net glass eel monitoring program is in serious trouble (Dekker 2004). Cost of the current labour-intensive lift net programme are high and the drastic decline of the glass ell catches have serious negative consequences for the statistical reliability of the collected data and for the motivation of the participating field staff. Dekker (2004) concluded that the development of a new, reliable and cost-effective method to monitor the annual glass eel recruitment was of utmost importance for the management of the depleted eel stocks. Leijzer et al (2009) tested several methods to monitor glass eel and their results indicated that light traps could provide a good alternative for lift nets in the glass eel recruitment programme. The light trap developed by Leijzer et al (2009) was cheap, easy to handle by one person and the catches showed similar temporal patterns as the lift nets. Leijzer et al (2009) concluded, however, that before light traps could be deployed in the field to replace the lift net, the new method required further fine tuning with regards to size and shape of the traps (Fig. 1a-c), light intensity (LED or glow sticks) and optimal position in the water column (Fig. 1d).  a) 'Doherty' b) 'Quarterfoil' c)'Leijzer' d) Fig. 1. Possible light trap designs (a-c) and positions in the water column (d) WORK PLAN JAN - Construction of different types of light trap FEB-APR - Field: conduct glass eel monitoring using the different light trap/position/light source combinations parallel to the lift net monitoring at Den Oever - Laboratory: retention experiments with the different light trap designs in tanks at IJmuiden MAY-JUL data analyses and report writing
Why should this be funded by KB WOT?	Eel is the most important species for freshwater fisheries (commercial and recreational) and aquaculture (outgrow glass eel). Eel stocks throughout its range have declined to the extend that in the Netherlands the commercial eel fishery is closed for 2-3 months (SEP-DEC) between 2009-2011. A reliable method to continue monitoring recruitment at these historically low stock levels is of utmost importance for the management of this species and warrants the investment of R&D resources provided by KB WOT. The project fits in Priority areas B and C (adjustment of data collection).
How does this relate to the IMARES development plan*	
Products to be delivered?	Light traps Scientific publication
How is dissemination of findings being addressed?	The result of the proposed study will be published in an international peer reviewed journal, a executive summary in Dutch, a presentation at a Vissennetwerk meeting and possible a presentation at a international fisheries conference.

Proposed budget	Research hours by scale: Salary: *Total 43.640* OASS 1 160 hours 9.600 OASS 2 285 hours 21.375 JONDZ 120 hours 11.400 ONDZ 5 hours 585 SONDZ 5 hours 680 Additional Expenditure: *Total 10.000* Travel 5.000 Material 5.000 Total cost: €53.640
Is the appropriate capacity available?	Yes, appropriate staff has been contacted and are available and willing to participate in the proposed research project.
What other potential funding sources have been considered?	None at this stage. However, light traps might be useful to collect larval and juvenile fish for other freshwater projects (e.g. ANT IJsselmeer Smelt Project) and if required some funding could potentially support the proposed research project.
What are the potential risks to the project's success?	The main threat to the project is that the experimental light traps are not constructed on time to be deployed in the field. The spawning period in early spring of smelt is short so it is of utmost importance that the construction of the different types of light traps commences immediately in January 2010.

Partially funded for methodological improvements.

Research priority Area:	Priority area A: "Influence of changes in the environment on marine ecosystems"
Title of project	Fish larvae in mesocosms
Number of project	14
Project leader	Edwin Foekema IMARES Dept. Environment
Participating partners	IMARES Dept. Aquaculture: Oliver Schneider, Edward Schram IMARES Dept. Ecology: Loes Bolle/Cindy van Damme? Wageningen University, Animal Breeding and Genetics group: Hilde van Pelt
Duration	January – December 2010
Broad description of the project	The main gaol of this project is to test the applicability of mesocosms in understanding the feeding ecology of fish larvae. Mesocosms, also referred to as 'experimental ecosystems', are large scale multispecies experimental systems that are generally used in ecotoxicological research. In a mesocosm environmental conditions can be manipulated and thus mesocosms allow studying the behaviour and development of fish larvae under various conditions, including the composition of the available planktonic food items. Seeing that climate directly impacts the marine ecosystem including plankton ecology, larvae first feeding (match/mismatch) and fitness/survival are directly related. For this project we will use mesocosm facilities (500 – 5000 litres) that are present at the Den Helder location of IMARES and combine the broad mesocosm experience that is available at this department for ecotoxicological research with the knowledge of rearing fish larvae from the department of Aquaculture. Since there is a lot of experience with aquaculture of Sole (*Solea solea*) this species will be used as model species for this first trail. Fertilised sole eggs are available from own sources and commercially (Contingency plan). The development of the early life stages of Sole will be followed in mesocosms under different conditions, in order to find the key processes involved in their healthy development in relation to plankton composition and productivity, that can be influenced by manipulating for instance water temperature, nutrient levels and/or light conditions. The water characteristics as well as the presence of the potential food items (phyto- and zooplankton) in the mesocosm will be monitored and the food preference of the fish will be determined by examination of the gut content of sub samples. The observations will last until the fish have reached a size of about 1 cm. At this size the most critical developmental phase is over and malformations are obvious when present. In addition to conventional methods DNA/RNA ratios will be determined for the fish to evaluate their fitness. The same technique can be used to assess the fitness of fish larvae in the field. Data will be compared to fish reared in aquaculture using standard protocols and diets. Under natural conditions the development of the fish larvae to a 1 cm juvenile will take about 40 days, which allows various trails to be run in one year using the same mesocosm systems. In addition to this direct relation to the research area: Priority area A: "Influence of changes in the environment on marine ecosystems" this project has the potential to generate useful information for aquaculture purposes. Recent publications indicate that mesocosms can be used successfully for rearing fish larvae. Fish reared under traditional conditions often show a relatively high incidence of malformations and –pigmentation, which can be related to the insufficient quality of the food items that can be offered. The advantage above the traditional rearing technique is that the fish in mesocosms have a free choice between varieties of food items. The rearing of fish larvae therefore is one of the most critical parts in the aquaculture process, and forms the bottleneck for broadening the number of fish species that can be aqua-cultured successfully on a commercial basis. Moreover, the project will also produce valuable knowledge that can be used for ecotoxicological and ecological research with fish larvae under semi natural conditions.
Why should this be funded by KB WOT?	This project directly connects the excellent knowledge of two departments of IMARES namely dept. environment and dept. aquaculture into an area that is relatively new and has high potential for initiating future projects Since the necessary test facilities are already available within IMARES the project is cost effective.
How does this relate to the IMARES development plan*	This project has strong links with 3 of the 4 IMARES themes: 'climate', 'pressure on the ecosystem' and 'sustainable marine production'. In addition, the project plan combines the expertise from all IMARES departments and should result in valuable insights with the potential for IMARES broad application in future research projects.
Products to be delivered?	Scientific report with potential for publication. Conference contributions for 2010.
How is dissemination of findings being addressed?	Besides the preparation of the scientific paper, the results will be presented at various platforms for stakeholders and scientist.
Proposed budget	50 k€
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	None, as this project is related to knowledge base and extension of the competitive position of IMARES
What are the potential risks to the project's success?	No specific risks, sole eggs can be obtained from own sources or from a commercial farm and test facilities are available.

Not funded as project lacked focus and outside fisheries WOT remit.

Research priority Area:	A B C D
Title of project	Long term demographic, phenotypic and genetic changes in European eel populations: driven by or driving anthropogenic impacts?
Number of project	15
Project leader	Willem Dekker
Participating partners	Internal: Willem Dekker, Adriaan Rijnsdorp External: KULeuven, Fiskeriverket Sweden
Duration	2 yrs
Broad description of the project	Eel: the interaction between population dynamics, phenotypic and genetic changes under human pressure and a changing climate, using historical otoliths. The temperate eel stocks are in decline for more than half a century, probably due to anthropogenic and natural factors. To disentangle the likely causes of the decline (anthropogenic or natural), the analysis of our invaluable historical otolith collection will allow the joint analysis of the genetic background/shifts (original structure is potentially completely destroyed by large scale transplantation of tons of glass eel in the past) at neutral and adaptive markers, and potential trends in growth (also under influence of eutrophication, temperature, etc) during the past decades. As such, demographic and evolutionary changes will be analysed in depth, enabling better management decisions in future. The cooperation aiming at the analysis of the historical collection involves: a PhD project in Leuven (population genetics and adaptation), Fiskeriverket Sweden (ageing). This proposal covers the local population dynamics of Lake IJsselmeer eel stock. Leuven will perform the main practical work for genetic analyses and otolith reading. Amongst others, this requires ageing of most material. The focus of the work will be on Lake IJsselmeer, the only water body with such a long time series of data and otoliths in the world. For Lake IJsselmeer, earlier research has delivered partial analyses of recruitment, abundance, fishing impact, but not growth and mortality. Growth (ageing) will be performed in Leuven/Stockholm. Assessment of mortality remains to be inferred, which can be determined from the observed abundance by 'subtraction' of the other processes. That will complete the one and only case study on the world, where the observed decline of the stock is completely documented during the period of decline (ca.1950-recent)! Since the decline of the continental stock (since 1960) preceded (and caused?) the recruitment decline (since 1980), this is likely to give new insights on the ultimate causes of the current stock collapse.
Why should this be funded by KB WOT?	WOT tackles routine sampling of eel stocks and fisheries, but the essential long-term development and process analysis is completely lacking. The cooperation with Leuven on genetics, will leave the crucial population dynamics component mostly untouched. As Leuven is performing the ageing and genetics part, a small analysis project will constitute the much needed finishing piece for the complete story. Strong link to WOT routine sampling, but focused on process-analysis, KB.
How does this relate to the IMARES development plan*	The eel issue is above all a management issue, fitting into our core business on sustainable exploitation. However, the broader process analyses proposed here will explore potential climate effects, will consider broader anthropogenic pressure on the ecosystem, and address long-lasting, possibly highly detrimental effects of past anthropogenic impacts. The eel issue being of high political interest, and following a central role of Imares in the eel debate at the national and international level, the interest in eel is now rapidly spreading in the academic world. Developing a strong partnership with such groups is of high importance for future research cooperation.
Products to be delivered?	Trends in growth, analysis of population dynamics of IJsselmeer eel stock, article. Co-supervision of PhD thesis in Leuven, several articles with co-authors.
How is dissemination of findings being addressed?	in scientific articles, contributions to national and international meetings, etc. No specific budget reservation.
Proposed budget	Research hours by scale: 2*160 senior scientist 37,440 Additional Expenditure: some local travel. 2,560 Total cost over two years: € 40,000
Is the appropriate capacity available?	yes
What other potential funding sources have been considered?	Most costs are covered by the KUleuven, though 24 months PhD student project. Only the supervision of a PhD, and a specific contribution remain open. Leuven has attempted the inclusion of this topic in an ongoing EU project (FP7-FinE), but the lack of basic demographic/phenotypic data resulted in the rejection of this species as case study (although officiously included now), emphasizing the need for the proposed project to increase the chances for future project inclusion.
What are the potential risks to the project's success?	A pilot study in historical otoliths has tested the DNA quality/quantity (successful) and age readability (ongoing) Risk of Leuven or PhD-student not delivering; small risk. Risk of chaotic results. That is part of our live.

Funded

Research priority Area:	B
Title of project	Dynamics of harvested food webs
Number of project	16
Project leader	Tobias van Kooten
Participating partners	Internal: Jan Jaap Poos External:
Duration	1 year
Broad description of the project	The management of marine resources is increasingly shifting from a system where exploitation boundaries are calculated on species in isolation, to a system where the ecological interactions of the marine environment are being taken into account. The science behind this advice has to catch up with this paradigm shift (see eg. Mackinson *et al.* 2009). One sign of this shift is the European Commissions wish to obtain more information about the population dynamics of a wide range of flatfish species, which has resulted in the NESPMAN project. Here we plan to study the dynamics of a small foodweb, representing a number of flatfish species that are harvested (or at least suffer additional mortality from fishing) by the Dutch beam trawl fleet. Using a model that is a combination of simultaneous stage structured population dynamics of 5 species, feeding on a limited number of resources, and a fleet dynamic model, we aim to show how the dynamics of the system are fundamentally altered when ecological interactions –in this case competition for food- are taken into account. Starting from a system where each fish species has an exclusive resource, which represents the 'single species in isolation' paradigm, we study the consequences of introducing diet overlap among species, and thereby competition. We will study a range of different food web configurations, with different degrees of diet overlap. When diet overlap is high, strong resource competition occurs, and competitive exclusion is expected to lead to the extinction of fish species. Fisheries mortality can ameliorate competition, thereby promoting the persistence of competitively inferior species. A fundamental understanding of how the effect of fishing changes when we consider the target species as part of a single ecosystem, rather than as single stocks in isolation, is crucial if we are to develop an integrated management approach to flatfish exploitation in the North Sea.
Why should this be funded by KB WOT?	The paradigm shift of moving from single species advice focusing on individual fish stocks to advice on fisheries and their effects on the ecosystem is ongoing. This research combines our knowledge of ecological interactions in food webs and fleet dynamics, two areas at which Wageningen IMARES is at the forefront. Although the results will not be immediately applicable in day-to-day advice, the long term consequences of fishing on food webs has proven to be a powerful tool in the communication with the fishing industry. An example of this is the great enthusiasm with which ECOPATH/ECOSIM models have been received in the North Sea RAC. By investing in this type of modelling tool, we strengthen our position as advisors for marine resources.
How does this relate to the IMARES development plan*	This proposal shows how fishing pressure on the ecosystem work in detail. It will provide knowledge needed for an ecosystem approach to marine management, and as such falls under the 'marine policy' theme in the IMARES development plan. Climate change is considered to lead to changes in species range overlap, so that new species interactions will emerge. This project deals with such changed interactions and the results are therefore expected to be applicable in a climate change framework.
Products to be delivered?	We plan to write a publication and will ask the NSRAC if they have interest in discussing the outcomes of the study
How is dissemination of findings being addressed?	The dissemination of findings is guaranteed by the product: a scientific paper to present the findings to the scientific peers, and communication with the NSRAC to present the findings to stakeholders
Proposed budget	Research hours by scale: Jan Jaap Poos 100 hrs * 117 €/hr = € 11.700 Tobias van Kooten 300 hrs * 95 €/hr = € 28.500 Additional Expenditure: Travel costs (required to visit NSRAC) € 1.000 Total cost: €___41.200_____
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	None
What are the potential risks to the project's success?	The link to immediate advice is now weak. Given how the NSRAC appreciated the use of ECOSIM/ECOPATH, we anticipate their interest in our findings. However, this is not guaranteed. In the case the NSRAC does not show interest, the communication to stakeholders will have a smaller role in the project.
References	Mackinson, S., Deas, B., Beveridge, D., Casey, J. 2009. Mixed-fishery or ecosystem conundrum? Multispecies considerations inform thinking on long-term management of North Sea demersal stocks. Canadian Journal of Fisheries and Aquatic Sciences 66 (7), pp. 1107-1129

Not funded as strong idea but needed more specifics

Research priority Area:	B/ C
Title of project	The ecosystem consequences of spatial planning in the North Sea: the importance of fleet dynamics
Number of project	17
Project leader	Jan Jaap Poos
Participating partners	Internal: Niels Hintzen, Adriaan Rijnsdorp External: Darren Gillis
Duration	1 year
Broad description of the project	The management of the marine resources of the North Sea is evermore shifting towards a system where spatial planning in the context of an ecosystem approach to resource management is an important component. As a result, fishing in the North Sea will very likely be prohibited or restricted in certain zones. The results of possible relocation of fishing effort away from the closed zones may have unanticipated effects on the dynamics of the targeted resource community and sustainability of the resources. In this project, we aim to maintain and extend the knowledge of fleet behaviour that is the basis of understanding the effect of fisheries management on the spatial use of fishing fleets. We focus on the importance of spatial modelling the marine resources. We extend existing fleet dynamics models explaining the changes in spatial distribution of the Beam trawl fleet fishing for sole and plaice. These models have shown how the shift of fishing effort towards the Southern North Sea can be explained by the changes in landings quota of sole and plaice. This shifting effort has important consequences for the exploitation of plaice, and probably many other species. The fleet dynamics models are currently lacking realistic size dependent migration patterns in the two target species plaice and sole. This is an important shortcoming in using these models for advice, because it implies that discarding marketable fish will only occur once the quota has been reached. In reality, such discarding can also occur before the quota is reached. Having size structured migration in the model thus brings it an important step forward. When adding the complexity of size structured target species in the behaviour requires a new modelling framework. Currently, Dynamic State Variable Models have been used to determine the optimal strategy of fishers. The extension of the model uses Genetic Algorithms, a state-of-the-art heuristic optimization tool, to find the solution of complex problems efficiently. The end result of the project is a working model that can predict the effects of spatial and quota fisheries management on fishing fleets and target species. This model can thus be used in the discussion on different management options proposed or implemented in the future.
Why should this be funded by KB WOT?	The management of the North Sea resources demersal fisheries will likely consider a range of management tools, including spatial differentiation of the North Sea, restricting the Dutch beam trawl fleet. This project allows taking into account the dynamic behaviour of the fishing fleet in evaluation of spatial management. Because the model describes a small food web, of two prey species and the most dominant predator (the fishery), it will allow studying the switch from single species management to (spatial) community management envisaged in the ecosystem approach. The hours spent in model development are partly used in the supervision of the MARIFISH PhD project. This mean that the funding is matched by the work done in the PhD project, and that the coaching of the PhD student is strengthened. To conclude, funding this project will strengthen our leading position in fleet dynamics by developing a unique model of the Beam trawl fleet and its target species.
How does this relate to the IMARES development plan*	This project is on the border between sustainable marine production (by evaluating the exploitation of sole and plaice), and marine policy (by taking into account spatial planning in the marine environment)
Products to be delivered?	We aim to deliver the following products: (i) we deliver a model for the Dutch beam trawl fleet, that can be extended to other demersal fleets; (ii) we describe this model in a manuscript on the ecological implications of fleet behaviour in a size structured two species resource exploitation that we send to a peer-reviewed scientific journal.
How is dissemination of findings being addressed?	If the manuscript is accepted, we will present the model and its results at a scientific conference. Also, we will bring the fleet dynamics modelling expertise forward in a session with the ministry of LNV.

Proposed budget	Research hours by scale: Research hours by scale (2010): Niels Hintzen 200 hrs * 95 €/hr = € 19.000 Jan Jaap Poos 190 hrs * 117 €/hr = € 22.230 Adriaan Rijnsdorp 60 hrs * 136 €/hr = € 8.160 Additional Expenditure: Travel costs € 100 Total cost in 2010: €_49.490___ Additional Expenditure: Total cost: €
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	Currently, no other funding sources have been considered for this particular project. However, there is other fleet dynamics work funded through other sources.
What are the potential risks to the project's success?	One potential risk is that the Genetic Algorithm is not able to able to find the optimal strategy in the highly complex environment that is formed by the two size structured target species.
References	Poos, J. J., Bogaards, J. A., Quirijns, F. J., Gillis, D. M., and Rijnsdorp, A. D. 2010. Individual quotas, fishing effort allocation, and over-quota discarding in mixed fisheries. – ICES Journal of Marine Science, 67: 000–000. Poos, J. J., Quirijns, F. J., and Rijnsdorp, A. D. 2010. Spatial segregation among fishing vessels in a multispecies fishery. – ICES Journal of Marine Science, 67: 000–000.

Funded

Research priority Area:	A B C
Title of project	Managing fish populations with realistic life-histories: understanding ontogenetic complexity in exploited fish stocks.
Number of project	18
Project leader	Reinier Hille Ris Lambers
Participating partners	Internal: Tobias van Kooten External: Karen van de Wolfshaar (WUR) Anna Gårdmark (Fiskeriverket)
Duration	1 year
Broad description of the project	Much of the traditional toolbox for management of fish populations rests on simple models in which fish do not feed, grow independently of food availability, encounter constant natural mortality (regardless of predator and food abundance and timing), and do not move. It is important to realise that these assumptions lead to unrealistic population dynamics, and tend to preclude any understanding of the natural variation and management of fish populations. In KBWOT 2009 we initiated a research line aimed at updating this toolbox by studying the effects of variation in natural mortality. Here we extend this research line by examining the implications of dietary shifts between life stages for understanding population dynamics and management of fish stocks. Many marine fish species have two or more life stages which are spatially separated and feed on different resources. The transition between these stages as individuals develop is called an ontogenetic niche shift. Often, these shifts are also accompanied by a shift in habitat, and/or of food source. The timing of such shifts tends to depend on the state of the individual, for which its size is often a better predictor than its age. Body size is a complex function of the food levels an individual has experienced throughout its life. The number of individuals and the timing of ontogenetic niche shifts hence also depends, in a complex way, on historic states of both the resource and the fish populations. As ontogenetic life stages are linked through development, mortality and competition in one stage can affect consecutive stages through effects on developmental rates, but can also affect earlier stages through effects on rates of offspring production. The consequences of these complex linkages between developmental stages have only recently begun to be explored in relation to exploitation of fish stocks (van Kooten et al 07, deRoos et al 08). Although these studies have yielded valuable insights, they have mostly focused on populations where all developmental stages stay in the same habitat and thus feed on the same resource. This limits their applicability to exploited marine fish stocks, and the implications of ontogenetic resource shifts for understanding the dynamics of fish populations, and for fish stock management are almost unknown. In an initial attempt van de Wolfshaar, HilleRisLambers & Gårdmark (submitted manuscript) have developed a stage structured consumer-resource model studying the implications of such habitat dependant ontogenetic niche shits. The results from this study have, for example, underlined the importance of the juvenile habitat for regulation of *adult* populations. Thus, protection and improvement of (often degraded) juvenile habitat may yield better results in terms of promoting population persistence and sustaining fisheries yield than management of adult populations. However: this model is still somewhat simplified, is not linked to any real fish species, and lacks a link to real data. The model predictions need to be validated, and our intent in this project is to link these model results to data. For this, we need to extend and parameterise the van de Wolfshaar et al. model to a) accurately reflect real fish, and then b) link model predictions to real data. We envisage this occurring in four steps: 1) Development and extension of a fully structured physiologically structured population model parameterised for real fish. * In order to fully match model results to data, this extension is crucial. One species for which the spatial separation is very obvious is herring. For successful spawning, herring depend on areas with gravel sediments, which are only found in certain areas in the North Sea. From these spawning grounds, larvae then move to nursery grounds, where they feed mostly on small zooplankton. After one or two years in the nursery grounds, they once again shift habitat to join the larger juveniles and adults. One advantage of herring is that we could build on the existing model development from models developed under KBWOT research on natural and fishing mortality, but we could also envisage other fish species such as plaice. 2) Testing model results with the best data available. This requires collating data both on fish population abundance, as well as sources of mortality affecting different life stages. * The sources of mortality at different stages could be i) fishing mortality, ii) winter starvation as a result of a mismatch between the timing of spawning and food availability, so it is important to assess the availability of data on these environmental factors as well as fishing data and fish population dynamics. * A cross comparison of both Baltic and north sea herring data will provide extra validation of model applicability and results. 3) Preparation of a manuscript based on these results 4) Dissemination of these results at international conferences.

Why should this be funded by KB WOT?	Current stock management is based on simplistic assumptions on factors regulating fish populations, ignoring food, growth, relationships with other organisms and spatial heterogeneity. To move to an ecosystem approach, realistic aspects of fish life-history ecology must be incorporated. This project extends and develops theory on management of fish involving food dependant development and spatial heterogeneity. This is crucial information in order to develop the ecosystem approach to management, and it is likely that knowledge developed in this project will lead to both high profile publications as well as anticipating the queries for advice from fisheries managers in the future.
How does this relate to the IMARES development plan*	This project relates fish population dynamics to natural and fishing mortality, and conditions for management of these populations. Current management is based on unrealistic fish life histories, and extension of this toolbox is essential for sustainable marine production . In addition, climate factors may regulate food sources for different life stages, and thus growth and mortality
Products to be delivered?	A structured herring model, fully parameterised. Knowledge on factors regulating real fish populations and management implications thereof.
How is dissemination of findings being addressed?	Manuscript and presentation at international conferences.
Proposed budget	Research hours by scale: 350 hours JONDZ : * 100 = 35000 Additional Expenditure: 5000 presentation of results at international conferences and/or other appropriate venues. 2000 publication expenses (open-access) Total cost: €42000
Is the appropriate capacity available?	Yes, both internally, as well as externally.
What other potential funding sources have been considered?	* KBWOT is most appropriate: This project aims to develop the knowledge necessary to manage exploited populations under an ecosystem approach. This approach is novel, and thus needs fleshing out, before a) embedding in external project proposals and b) before incorporation in advice. * Reinier Hille Ris Lambers has already invested some 2 weeks of vacation time in model development and manuscript preparation.
What are the potential risks to the project's success?	None foreseen, though capacity problems (overplanning, potential job shifts) are always to be considered.

Not funded as link to KBWOT goals not clear enough and overambitious for the resources requested

Research priority Area:	C and D
Title of project	Forage Fish Interactions (FACTS)
Number of project	19
Project leader	Mark Dickey-Collas
Participating partners	The EU 7th framework project FACTS.– 15 institutes from 8 different European states.
Duration	3 years (2010 will be the first year)
Broad description of the project	FACTS will develop and disseminate advice on the consequences of various forage fish harvest strategies to the ecosystem including their economic implications. FACTS research focuses on seven forage fish species (anchovy, herring, capelin, Norway pout, sardine, sandeel and sprat) that are a major natural resource to the European community and represent key elements in the functioning of marine ecosystems. FACTS will eliminate critical gaps in knowledge that currently exist concerning the impact of variations in forage fish populations (due to various drivers such as climate and fishing) on the trophodynamic structure and function of different European marine ecosystems. The North Sea is a case study, being lead by IMARES. FACTS will answer the following questions: 1. What are the major short- and long-term drivers of changes in commercially and ecologically important forage fish populations within European waters? 2. What are the biological and economic consequences of changes in forage fish populations in terms of their prey, their competitors and their predators? 3. What are the biological and economic consequences of changes in predator populations on forage fish populations and their fisheries? 4. What is the role of forage fish species in maintaining biodiversity and ecosystem stability? This is the first IMARES project that brings researchers in a coordinated way from the research areas of marine mammals and fisheries. FACTS will develop new operational models that estimate the biological and economic tradeoffs associated with various exploitation strategies of forage fish stocks in major European fisheries. Moreover, as the main providers of advice on forage fish in the North Atlantic, FACTS partners are also able to translate these model outputs into urgently needed advice on how best to move beyond the single-species approach of current fishery assessments and adopt ecosystem-oriented management. The FACTS project is thus addressing major research objectives set forth by the revised Common Fisheries Policy, the Marine Strategy Directive (2008/56/EC) and EU Marine and Maritime Research Strategy.
Why should this be funded by KB WOT?	This is a core part of WOT, as it is specifically focused towards improving management advice for forage fish. KB WOT will gain added value by the €300,000 funding from the EU and €30,000 from the IMARES directorate for two remaining years of a PhD
How does this relate to the IMARES development plan*	This project relates to assessing pressure on the marine ecosystem ands sustainable marine production.
Products to be delivered?	A series of scientific papers,technology transfer from across Europe to IMARES.
How is dissemination of findings being addressed?	FACTS is tasked with producing resources (as reports, published papers, books and web material).
Proposed budget	Cofinancing : €70,000 over three years. Total cost: € 23,500_____
Is the appropriate capacity available?	Yes. Mark Dickey-Collas, Reinier Hille Lamis, Thomas Brunel, Meike Scheidat, Geert Aarts and Kristina Raab are involved.
What other potential funding sources have been considered?	This is an EU funding project which requires 3 years of cofinancing. The EU provide €300,000 and IMARES directorate €30,000. The total international budget is €4 million.
What are the potential risks to the project's success?	The project is medium risk

Funded .

Research priority Area:	B/C
Title of project	Operationalisation of management advice on fisheries induced adaptive changes
Number of project	20
Project leader	Jan Jaap Poos
Participating partners	Internal: Adriaan Rijnsdorp, Reinier Hille Ris Lambers External: Fabian Mollet (IIASA), Bruno Ernande (IFREMER)
Duration	2 years
Broad description of the project	This project aims at exploring ways of making advice on the evolutionary consequences of harvesting operational. The evidence for evolutionary changes in life history traits of harvested species has been mounting. This is also the case for the commercially important North Sea flatfish species sole and plaice, where changes in maturation have been observed that can be explained by the selection pressures caused by length-selective fishing. Currently, model development bring us closer to evaluating the evolution induced by fisheries under different harvesting strategies. (i) A detailed eco-genetic model has been developed on the evolutionary consequences of different harvesting strategies for plaice. Currently, this model is being adapted to model North Sea sole as well. (ii) Another evolutionary model, developed at IFREMER, focuses on harvesting induced changes in maturation and range expansion of the Japanese Oyster. Currently, the use of these models to provide management advice by IMARES on the evolutionary consequences of annual harvesting options (e.g. in an ICES context) is currently not possible. First, the models are highly complex, and developed to study the effects of a broad range of biological complexities on the evolutionary dynamics. Second, running the models is cumbersome, because the parameter settings are hard coded into the model, and the models have to be recompiled for each run. Third, with the end of Fabian Mollets PhD period, the expertise built up on the eco-genetic models is not present at IMARES. We therefore propose to operationalise eco-genetic models at IMARES by (i) simplifying the eco-genetic models by reducing the biological complexities, keeping a parsimonious formulation, (ii) creating an R front-end to the models that can easily be used in the context of ICES expert groups, and (iii) testing and modifying the Japanese Oyster model to study size selective consequences of harvesting in collaboration with IFREMER. The results of this work will allow IMARES to provide fisheries managers with the evolutionary consequences of their decisions, and increase the knowledge on eco-genetic modelling. The work is consistent with the workplan developed within the ICES Study group on Fisheries-Induced Evolutionary Change (WGEVO from 2010 onwards).
Why should this be funded by KB WOT?	This project expands the services that IMARES can provide to fisheries managers. With the increasing awareness of the potential effects of fishing on the evolution of life history traits, it is very likely that fisheries managers will ask for advice on fisheries management that not only optimally uses the resource from a population dynamic perspective, but also from an evolutionary perspective, thus taking into account the changes in life history traits that affect the optimal harvesting strategy. In addition, the models allow studying adaptation to novel habitats and species' range expansion. Funding this project is thus a strategic step, anticipating the changes in the WOT questions posed by fisheries managers
How does this relate to the IMARES development plan*	The project addresses the evolutionary dimension of harvesting to sustainable marine production by explicitly incorporating the potential changes in harvestable production as a result of fisheries induced evolution. This is clearly an aspect of sustainable fishing that will gain importance in the future.
Products to be delivered?	The project will deliver an eco-genetic model for both sole and plaice, that can be used in R, and operated in the context of ICES expert groups. It will also deliver a evolutionary model for Japanese Oyster, that can be used both to study harvest induced evolution as well as adaptation to novel habitats and species' range expansion.
How is dissemination of findings being addressed?	The operational model can be used at WGNSSK 2011, and the results presented in the WGNSSK 2011 report.
Proposed budget	Research hours by scale (2010): Jan Jaap Poos 170 hrs * 117 €/hr = € 19.890 Reinier Hille Ris Lambers 210 hrs * 95 €/hr = € 19.950 Adriaan Rijnsdorp 150 hrs * 136 €/hr = € 20.400 Additional Expenditure: Travel costs € 7.500 Total cost in 2010: €_67.740___ Please note: Participation in ICES WGEVO (co-chair Rijnsdorp) is not included in the above budget. We plan to apply for € 35.000 KBWOT funding in 2011 (this being a 2 year project).
Is the appropriate capacity available?	With this project team, the appropriate capacity is available. Moreover, the project team has a number of contacts that will be of help in achieving the project goals.
What other potential funding sources have been considered?	Currently, no other funding sources are available for this project. The project is an extension of the FP6 project FinE that ends in summer of 2010.
What are the potential risks to the project's success?	A potential risk to the project's success is the simplification of the eco-genetic model. If the model cannot be sufficiently simplified without loosing biological realism, the use of the model by a broad option is unlikely.

Partially funded (€42 000)

Research priority Area:	C and D
Title of project	Reproductive Biology and Management in Marine Fish (FRESH)
Number of project	21
Project leader	Mark Dickey-Collas
Participating partners	The EU Cost action FRESH – institutes from 14 different EU member states and Canada. The NAFO working group on fish reproduction.
Duration	3 years (2010 will be the third year)
Broad description of the project	IMARES is a member of the EU cost action FRESH (fa 0601)- the intergovernmental framework for European Cooperation in scientific and technical research. FRESH provides funding for travel and subsistence to attend scientific meetings and workshops on fish reproduction, management and the provision of advice. The novel idea behind the action is to bring biology together with management in usable products. The main objective of FRESH is to establish a network of researchers to co-operate on the improvement of knowledge on fish reproduction in relation to fisheries and the enhancement of the current assessment methodology in order to promote sustainable exploitation of marine fish resources. This KB WOT project would provide the hours for IMARES staff to attend the workshops and meetings to improve our expertise in fish reproduction and fisheries management.
Why should this be funded by KB WOT?	This is a core part of WOT, as it is specifically focused towards improving management advice. KB WOT can also gain added value by utilising the FRESH funds for travel and subsistence.
How does this relate to the IMARES development plan*	This project relates to assessing pressure on the marine ecosystem ands sustainable marine production.
Products to be delivered?	A series of scientific papers, a book and a synthesis document. Technology transfer from across Europe and North America to IMARES.
How is dissemination of findings being addressed?	Fresh is tasked with producing resources (as reports, published papers, books and web material). It will use the COST network of the EU to help fund these.
Proposed budget	Hours: 90 JOND 80 SOND Total cost: € 19,000_____
Is the appropriate capacity available?	Yes. Cindy van Damme, David Miller, Thomas Brunel and Mark Dickey-Collas are involved.
What other potential funding sources have been considered?	FRESH will provide up to €30 k a year to fund travel to workshops and short scientific trips.
What are the potential risks to the project's success?	The project is low risk

Funded.

Research priority Area:	D
Title of project	KB WOT International exchange
Number of project	22
Project leader	Mark Dickey-Collas
Participating partners	ICES
Duration	1 year
Broad description of the project	To participate in all relevant international exchanges with ICES – see table below
Why should this be funded by KB WOT?	This is a core component of KBWOT and address all of the research priority areas
How does this relate to the IMARES development plan*	Exchange with ICES supports all of the IMARES development plan themes
Products to be delivered?	Reports for each exchange
How is dissemination of findings being addressed?	Internal report, ICES document, ICES web site, papers
Proposed budget	See table in proposal extra Total cost: € 171,000_____
Is the appropriate capacity available?	Yes.
What other potential funding sources have been considered?	WOT, projects and international networks
What are the potential risks to the project's success?	The project is low risk

Funded although changes made to the submitted list to reflect KBWOT priorities.

Research priority Area:	D
Title of project	KB WOT Programme Management
Number of project	23
Project leader	Mark Dickey-Collas, Frans van Beek
Participating partners	None
Duration	1 year
Broad description of the project	Development, coordination and reporting on the KB WOT research programme
Why should this be funded by KB WOT?	The programme requires strategic development and coordination
How does this relate to the IMARES development plan*	KBWOT supports all of the IMARES development plan themes
Products to be delivered?	A KB WOT 2009 plan and the report for KBWOT 2008.
How is dissemination of findings being addressed?	Ensuring that the products of KBWOT are publicised.
Proposed budget	Research hours by scale: includes 110 hrs Mark DC, 30 hrs van Beek both scale 13 Additional Expenditure: overseen extras costs (€ 500,) Total cost: € 19,100_____
Is the appropriate capacity available?	Yes.
What other potential funding sources have been considered?	None
What are the potential risks to the project's success?	The project is low risk

Funded

Research priority Area:	A,C
Title of project	Natural and fishery induced variations in the demographic structure of exploited fish stocks
Number of project	24
Project leader	Thomas Brunel
Participating partners	
Duration	4 weeks
Broad description of the project	It is often argued that fishing modifies the age structure of fish stocks, namely, reduces the mean age and age class diversity in the stock. Those demographic changes directly affect the dynamics of the stocks, in ways that can reduce their resiliency to fishing or environmental changes.. Changes in the age structure of the spawners may also have consequences on stock's reproductive potential, and thereby on recruitment (although this effect is observed only for a limited to a small number of stocks[1]). But variations of the spawners age structure are also linked to other causes than the effect of fishing, namely the variability in year-class strength, which affects the relative size of the different age-classes composing the stock, and variability in biological characteristics, such as maturation. It is important to identify the relative importance of these different sources of variability in the age structure, in order to know if the potential consequences of age structure changes can be ascribed to fishing (and then could be avoided by appropriate management measures) or result of more "natural" causes. A previous study[1] identified different types of age structure variability among the North East Atlantic fish stocks (i.e. high/low variability in the age structure, presence/absence of long-term changes vs. interannual variability). I propose to complement this typology by including fishing mortality, recruitment variability and some life history traits as explanatory variable in order to investigates if the patterns of age structure variability observed can be linked to an effect of fishing or to stock's life history characteristics. This study would be complemented by a simulation approach, based on a simple population dynamics model, where the respective effects of fishing, recruitment variability, and some life history traits on stock's age structure could be investigated. [1] Brunel, T. In prep. Is the age structure of the spawners determinant for recruitment? A meta analysis applied to North East Atlantic fish stocks.
Why should this be funded by KB WOT?	The idea that fisheries management should aim at protecting the age structure of fish stocks is getting more and more popular. But the question of knowing to what extent we can control the age structure of a fish stock by designing management strategies for this purpose has never been investigated. This project may therefore provide useful for information about this question.
How does this relate to the IMARES development plan*	This project is directly related to the theme "sustainable marine productions". It is indeed essential to understand to what extent fishing is affecting the demography of fish stock, compared to natural effects, in order to know if we can avoid undesirable age structure changes by adopting appropriate management measures. The project is also in relation with the "climate" theme, since : i) climatic changes are a potential cause of age structure variability (changes in recruitment regime, in growth and maturation) and ii) the age structure of a stock may be important for its resiliency to climate change.
Products to be delivered?	This study could potentially produce results that could be published in a paper entitled : "Respective influence of fishing and life history characteristics on the variability of the age structure of fish stocks in the North East Atlantic"
How is dissemination of findings being addressed?	
Proposed budget	160 hours for T. Brunel : 14 560 €
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	No, no other funding source have been considered. The project will however provide added value to several research projects ongoing at IMARES.
What are the potential risks to the project's success?	The datasets are already available, and the preliminary data treatment has already been done. There is low risk to the project's success.

Not funded as proposal to vague.

Research priority Area:	A
Title of project	Anthropogenic contamination causing skin discoloration in fish?
Number of project	25
Project leader	Ralf van Hal
Participating partners	Internal: Christiaan Kwadijk, Cindy van Damme
Duration	1 year
Broad description of the project	A large number of juvenile sole (*Solea vulgaris*) with skin discoloration is caught during the surveys performed by IMARES for the "PMR Compensatie monitoring 2de Maasvlakte". This number of discoloured sole is larger compared to surveys in other areas. A possible explanation could be the anthropogenic contaminants, present in the water and sediments in the heavily impacted area around the Maasvlakte, of which a large part (surveyed area) is a nature compensation area. A new method available at the Environment department of IMARES, "chemical screening using comprehensive GCxGC-MS", can detect multiple organic pollutants like polychlorinated biphenyls(PCBs), alkylated polycyclic aromatic hydrocarbons (PAHs), organochloorpesticides (OCPs) and poly brominated flame retardants (PBDEs) in a single analysis. Resulting in the chemical composition of the used sample. This chemical composition will be used to detect differences between 'normal' and 'malformed' sole, the differences in composition, higher concentrations of specific chemical components, will be examined in more detail using GC-MS. The next step will be to link the chemicals to physical and physiological functioning of the fish. This last step will be done by a literature study focusing on the effects of the specific contaminants on survival and development of fish. If the chemical composition does not give an explanation for the discoloration, the study will use the chemical signature of the different individuals for locating differences between nursery grounds and tracing the location of where the fish originate from. Then also eggs will be collected from the market sampling program to analyse parental effects on the chemical composition of larvae. By studying the transfer of chemicals from the females to the eggs.
Why should this be funded by KB WOT?	Anthropogenic effects of contamination on the marine ecosystem and fish stocks in particular is a less studied subject, specifically at IMARES, however it is part of the Good Ecological Status (GES) which should be reached according to the Marine Framework Directive (MFD). Contaminations can play a role in the survival of larvae and juveniles and if contaminated juveniles survive until commercial size there can be a potential risk for the food safety of human consumption.
How does this relate to the IMARES development plan*	Contaminants could play an important role as one of the anthropogenic pressures (priority area A) on the marine ecosystem and is part of one of the GES descriptors of the MFD. Also the combination of ecology and chemical analysis is one of the subjects which IMARES can easily study, by combining the strengths and expertise of the Ecology and Environmental department.
Products to be delivered?	- Composition of the chemicals in the tissue of sole in various areas along the Dutch coast. - A protocol for the use of the new method in future studies on effects of contaminants.
How is dissemination of findings being addressed?	Draft paper Scientific presentation
Proposed budget	Research hours by scale: 200h scale 7-9 300h scale 10-11 Additional Expenditure: chemical analyses € 6500 Total cost: € 50.000_____
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	When the pilot analysis of the first , already available, samples would point at a clear chemical suspect, funding from the ministry or Rotterdam harbour could be considered.
What are the potential risks to the project's success?	Chemical analysis proposed can only be performed by a small number of the staff.

Not funded as more preparation needs to be done before considering this research.

Research priority Area:	C D
Title of project	The feasibility of detecting discarding of marketable plaice using currently available data
Number of project	26
Project leader	Stijn Bierman
Participating partners	Internal: Jan Jaap Poos; Adriaan Rijnsdorp External:
Duration	January 2010 - December 2010
Broad description of the project	Because the fishery on flatfish (mainly plaice and sole) in the Netherlands is essentially a mixed-species fishery, yearly allocated quota for individual species can be restrictive to the extent that fishers may choose to discard marketable fish of species for which the yearly quotum has been (nearly) exhausted (Rijnsdorp et al. 2007). In the case of such an event, it can be expected that marketable fish with the lowest market value per unit weight will be discarded, whilst the most valuable fish are retained. On the basis of anecdotal information form the fishing industry, and modelling results (Poos et al. in press), there are indications that discarding of marketable plaice is likely to occur in the fourth quarter of each year, when individual quota may be nearly exhausted, and fishers stand to gain most by discarding plaice in the lowest market categories. Ignoring discarding of marketable sized plaice will bias the population biomass and fishing mortality estimates, and hence undermine the quality of the management advice. In order to improve the advice on the state of the plaice stock, it is necessary to investigate whether it is possible to estimate amounts of discarded marketable plaice. However, in contrast to the discarding of non-marketable fish (below the minimum allowed landing size), for which a sampling program exists, it is presently unclear if and how this can be estimated, and what data and other information would be necessary and available. The aim of the proposed project is to investigate whether it is possible, on the basis of the information available, to detect evidence of discarding of marketable plaice and relate this to information on the two variables that we believe influence this most: 1) (differences in) prices of market categories, and; 2) the size of the remainder of individual quota. The market category composition between trips that were made in the same period, and in the same fishing area will be compared. The likelihood of landings consisting of markedly lower proportions of the lowest market categories will be related to the difference in prices between market categories and the size of the remainder of individual quota, or any other type of a-priori information that may be used to group trips. However, whilst information on prices and market categories is currently available, we do not have information on remainders of individual quota in the fourth quarter. Thus, an important part of the project will be to explore if and how this data can be obtained, and how necessary it is in order to gain insight into this type of discarding.
Why should this be funded by KB WOT?	Discarding of marketable sized fish (highgrading) is viewed as a fundamental flaw of the CFP which is based on single species TACs in mixed demersal fisheries (Rijnsdorp et al., 2007 J Sea Res). Insight in the occurrence and extend of high grading will have important implications for the discussion around the revision of the CFP, as well as on the quality of the stock assessment and the management advice. It is presently unclear to what extent discarding of marketable plaice occurs, and whether this can be investigated in a quantitative manner. This project will partly close this knowledge gap by finding out which information is necessary and/or availability, and what sort of analyses and statistical techniques may be appropriate.
How does this relate to the IMARES development plan*	Because the age-composition of discards of marketable plaice will be different from that of the landings, ignoring this may lead to a pronounced bias in the assessment of the plaice stock. Furthermore, there is need to obtain more insight into this type of discarding, as it can be seen as an unwanted side-effect of the current management strategy of the fishery, which partly undermines the credibility of the strategy. For these reasons, this project links in to the 'sustainable marine production' and 'marine policy' themes.
Products to be delivered?	A paper on the possibilities, and available data sources, to investigate in a quantitative manner to what extent discarding of marketable plaice occurs in the fourth quarter.
How is dissemination of findings being addressed?	In the form of a scientific paper, to be submitted to an ISI listed journal.
Proposed budget	Research hours by scale: JONDZ : 20 days (Stijn Bierman: databasing (5 days); statistical analyses (10 days); writing paper (5 days)): €14880 JONDZ: 4 days (Peter van de Kamp/Daniel Benden; databasing; writing SQL code): €2976 ONDZ : 10 days (Jan-Jaap: advising; assisting with analyses; writing paper): €9200 SONDZ : 5 days (Adriaan: advising; acquiring data; writing paper): €5320 Total cost: €32376,- _____
Is the appropriate capacity available?	YES
What other potential funding sources have been considered?	NONE
What are the potential risks to the project's success?	It is possible that data on individual quota can not be obtained, or not within the time scale of the project. In this case, the project can still be concluded successfully, but the outcomes will be of less importance.

Funded

Research priority Area:	A+D
Title of project	Cooperation with ICES: implementation of survey data into ICES databases – egg and stomach data
Number of project	27
Project leader	Ingeborg de Boois
Participating partners	Internal: Cindy van Damme External: In cooperation with ICES Data Center, vTi Germany, IFREMER France, CEFAS England, MSML Scotland, DTU-aqua Denmark and IMR Norway
Duration	1-1-2010 – 31-12-2010
Broad description of the project	(a) In 2004 and 2009 ICES North Sea Plaice and Cod egg surveys coordinated by PGEGGS were conducted. In 2004 the collected data were stored at CEFAS in a Microsoft Access database. In 2009 data were collected in the same format but stored in the IMARES FRISBE database. The format of the ICES DATRAS database currently does not allow the data from the egg surveys to be uploaded. PGEGGS has requested ICES to amend the DATRAS format but up to now it has not been possible to upload the egg data. The survey data manager from IMARES, Ingeborg de Boois, will cooperate with the data managers at the ICES data centre. An ICES data manager will come to the Netherlands to discuss the necessary DATRAS format changes at the beginning of the year. The second half of 2010, when the format changes have been implemented Ingeborg will visit the ICES data centre to upload the egg data into the DATRAS database during half a week. The visit of Ingeborg will coincide with the meeting of PGEGGS in Copenhagen, to ensure that any questions concerning the egg data can be solved immediately. The storage of the egg survey data into the ICES DATRAS database will ensure that all PGEGGS data are stored in a central database where all interested will be able to access the data rather than the data being stored in different database in different institutes. WGDIM (2009) made the recommendation to: Chairs to write to Mackerel group with view to developing a work plan aimed at bringing the Mackerel Egg database on-line in late 2010. If the DATRAS changes for the data of the plaice and cod egg survey can coincide with the changes for the mackerel egg data this will ensure all data from different egg surveys will be possible to upload into a central ICES database. (b) In 1981 and 1991 the year of the stomach was carried out by different institutes in the ICES community. Data are available at ICES and at IMARES but the status of the data is unclear. It is, however, evident that IMARES has a more complete dataset (more species) than ICES. For this, cooperation between ICES Data Centre and IMARES is necessary to agree on a validated year of the stomach dataset. Since there will be a year of the stomach in 2011 it is important to have a proper data set of the old data. Within the project, the IMARES survey data manager Ingeborg de Boois will cooperate with ICES Data Centre (Carlos Pinto). Carlos will visit IMARES in spring 2010 to work on the stomach data and get insight in the discrepancies and commonalities of the data. In November 2010, during the PGEGGS (see above), Ingeborg de Boois will visit Copenhagen to work on the stomach data for half a week. During the year, IMARES and ICES will keep in close contact on the progress of the project.
Why should this be funded by KB WOT?	This project falls within the two priority research areas: a) influence of changes in the environment on marine ecosystems and d) maintenance and international exchange of key WOT expertise This project involves the maintenance of data storage of stomach and egg survey data. The storage of the data in ICES database will ensure that data are stored centrally and will be accessible to all interested. When format changes are realised, in future it will be possible to upload all stomach and egg data to be collected in WOT or other ICES coordinated programs into a central ICES database immediately after collecting the data. ICES is planning a new year of the stomach in 2011, therefore it is important to amend the ICES database in 2010. The data of the year of the stomach will be implemented into the MS VPA in future.
How does this relate to the IMARES development plan*	The availability of stomach data is relevant for climate and ecosystem studies and sustainable marine production (ICES WGSAM). The availability of egg data is relevant for sustainable marine production.
Products to be delivered?	Stomach and egg survey data to be stored in the ICES databases
How is dissemination of findings being addressed?	Via ICES Data Centre newsletter (stomach data) and PGEGGS report (egg data)
Proposed budget	Research hours by scale: (a) Egg data: total 48 JOND Joint session at IMARES, spring 2010: 24 Joint session at ICES, autumn (PGEGGS) 2010: 24 (b) Stomach data: total 124 JOND Joint session at IMARES, spring 2010: 32 Stomach data → FRISBE (IMARES database): 40 Joint session at ICES, autumn (PGEGGS) 2010: 24 Analysis of discrepancies: 28 Additional Expenditure: Material 250 euro Travel and subsistence 1000 euro Total cost: €15996 + 250 + 1000=17246

Is the appropriate capacity available?	Ingeborg de Boois has the required knowledge and capacity available.
What other potential funding sources have been considered?	It is not possible to fund this through WOT surveys or other funding sources.
What are the potential risks to the project's success?	Ingeborg de Boois has the knowledge of the how stomach and egg data are collected and stored in the individual database. She also uploads the WOT survey data into ICES data bases. Through this she has already many contacts at the ICES data centre. The meeting of PGEGGS will coincide with Ingeborg's visit to the data centre to ensure questions can be solved upon arising.

Not funded as project seen not related to fit into key priority research areas but more appropriate to general IMARES funding.

Research priority Area:	D
Title of project	WKMSSPDF: Workshop on sexual maturity staging of sole, plaice, dab and flounder
Number of project	28
Project leader	Cindy van Damme
Participating partners	Internal: Ingeborg de Boois External: In cooperation with laboratories involved collection of maturity data
Duration	1-1-2010 – 31-12-2010
Broad description of the project	The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish. Laboratories involved in collection maturity data for the various assessment WG's are using different macroscopic maturity scale for the same species. Even those that use the same scale, may be using slightly different criteria to classify the maturity stages that are more prone to a subjective interpretation. This may lead to bias in the data that may be going to be used, for example, in fisheries stock assessment models, or in any other kind of analysis. Therefore, this workshop has the objective of reaching an agreement on a common scale to be used, but also to define objective criteria to classify the maturity stages of that scale. Term of References (TOR): a) Compare applied maturity scales and main criteria followed by the scientists/technicians involved in the national sampling, to classify each maturity stage for males and females. b) Validate macroscopic maturity determination with histological analysis. To be checked c) Standardise the criteria to classify each maturity stage. d) Propose a common scale, with common classification criteria, to be used by all laboratories. e) Identify the optimal sampling time to estimate maturity ogives. The expectation of TOR a) has the goal of measuring in what extent the criteria to classify maturity stages is coherent between technicians, and to identify where are the major sources of disagreement. TOR b) validate with histological analysis the macroscopic maturity stage, mainly the resting stages that are incorrectly classified as immature. With TOR c) it is intended to minimise those sources of disagreement, by discussing the structure and the criteria to be used in the common scale. The expectation of TOR d) is to have a common scale for maturity stage, with a common set of criteria to classify each stage, to be used by all labs. The TOR e) is to selected the spawning season period considered to estimate maturity ogive. Before the workshop macroscopic and microscopic samples need to be collected by the institutes involved. The samples can be collected through the running survey and market sampling program. However preparing of the histological slides requires extra time and expenses. For the maintenance of maturity staging of flatfish species it is important that 2 technicians who perform the staging in the field and one technician with histological expertise will participate in the workshop. Ingeborg de Boois and Cindy van Damme will chair the workshop and write the report and manuscript for a peer reviewed journal.
Why should this be funded by KB WOT?	This project falls within the priority research area: d) maintenance and international exchange of key WOT expertise Correct maturity staging is important for the determination of maturity ogives and SSB and therefore a key expertise in the market sampling and WOT surveys. This is the first international flatfish maturity staging workshop. Building on new expertise: at the moment, limited expertise on histological maturity staging on flatfish is present at IMARES. The workshop offers the opportunity to increase the knowledge which will be useful in quality assurance of the maturity staging.
How does this relate to the IMARES development plan*	Since correct maturity staging is important for the determination of maturity ogives and SSB, it fits into the development plan in 'sustainable marine production'
Products to be delivered?	Peer reviewed manuscript and ICES report with the results of the maturity staging workshop
How is dissemination of findings being addressed?	See products: via ICES community and via peer reviewed publication
Proposed budget	Research hours by scale: Preparation of material WKMSSPDF: 24 JOND Preparation of histological slides: 88 OASS + 40 JOND Report writing (incl. paper): 80 JOND Participation WKMSSPDF: 50 OASS + 100 JOND Additional Expenditure: Building/removing workshop: 24 JOND + 12 OASS + 12 FOND Material 2500 euro (material for histological slides and conference dinner) Total cost: €36570 (personnel) + 2500 = 39070
Is the appropriate capacity available?	Ingeborg de Boois, Cindy van Damme and technicians have the required knowledge and capacity available.

What other potential funding sources have been considered?	Technicians will be partly funded through other projects: 50 hours from WOT surveys and 50 hours from WOT market (this is not included in the above budget). It is not possible to fund this through other sources.
What are the potential risks to the project's success?	Knowledge and techniques are available at IMARES. If histological slides are not present at the workshop it will not be possible to validate the macroscopic staging.

Funded

Research priority Area:	A, B, D
Title of project	Effective bottom contact of trawled dredge
Number of project	29
Project leader	J. Craeymeersch
Participating partners	Internal: J. Jansen, D. de Haan, R. Witbaard, K. Goudswaard External:
Duration	1 month
Broad description of the project	In the coastal zone and in the deeper parts of the Wadden Sea most of the stations of the WOT-surveys are sampled with a trawled dredge. The length of the hauls is measured by a measuring wheel: a magnetic reed-contact counts the revolutions of the wheel. There are, however, doubts about the accuracy. First, the performance of the wheel is very bad in muddy areas because the wheel is hardly rotating. Secondly, the exact start and end of sampling is not known. During the process of releasing and hauling of the dredge the depth of penetration is changing. Finally, while towed the depth of penetration is changing too and, depending on the sediment morphology, the dredge probably doesn't penetrate deep enough to sample the target species adequately. Thus, the real effective bottom contact is unknown. Recently, the dredge has been used in some other projects in the coastal waters. In particular the Harbour of Rotterdam (HbR) wanted to improve the measurement of the length of the hauls. The dredge has been equipped with an aquadopp (to measuring the pitch e.g.) and altimeters (to measure the distance between the dredge and the sediment surface). The design has been enforced by HbR and no time has been given to really evaluate the measurements. IMARES should make his own conclusions based on these measurements and its technical knowledge and propose the way to make further improvements.
Why should this be funded by KB WOT?	Improvement of measurements at sea will be beneficial for future projects relating to all 4 themes, but especially those on climate (long-term studies), pressure on the ecosystem (wind mails, land reclamation) and sustainable marine production (more precise, density, biomass and stock assessments).
How does this relate to the IMARES development plan*	The project will evaluate the performance of the dredge. Product will be a proposal on the technical adjustments needed to improve the measurement of the effective sampled area (and, thus, a better estimate of species densities, biomasses and stocks).
Products to be delivered?	The results will directly result in a stronger position to tender for benthic studies.
How is dissemination of findings being addressed?	Research hours by scale: OASS: 16 JONDZ: 188 ONDZ: 16 Additional Expenditure: Total cost: €__20492
Proposed budget	Yes
Is the appropriate capacity available?	Funding by HbR.
What other potential funding sources have been considered?	Unknown.
What are the potential risks to the project's success?	

Not funded as proposal considered poor and did not match aims with resources requested

Research priority Area:	A B C
Title of project	Consistency between growth patterns and diet data
Number of project	30
Project leader	Tobias van Kooten
Participating partners	Internal: Ralf van Hal, Tessa van der Hammen, Stijn Bierman External:
Duration	1 year
Broad description of the project	Substantial research effort is currently devoted to developing and implementing an ecosystem-based approach to marine management, which can assess the effects of exploiting one species on the ecosystem as a whole. A fundamental assumption behind the plea for an ecosystem approach to management is that links between species and functional groups in the ecosystem are sufficiently strong that a change in one group does indeed propagate to other species/functional groups. An important link between harvested demersal stocks in the North Sea is their food. It has been shown recently based on diet data that many species have a substantial diet overlap (Labberton et al '09) and that this diet overlap leads to significant competitive interactions among species (Stuke et al '09). Food availability essentially determines the productivity of a population. When food is scarce, individual growth slows down, and starvation mortality may occur. Growth and starvation are individual-level processes, the rates of which are determined by *per capita* food availability. The growth of species which have substantial diet overlap are expected to respond similarly to resource availability. In this project we aim to find such correlative patterns in the growth of several North Sea fish species. Based on a combination of back-calculated growth trajectories, size-at-age data from survey samples, annual length-frequency estimates which are used in stock assessments, and the abundance and fishing mortality rates, we will use exploratory data analysis to look for correlations among species growth rates and abundances. We take into account the fishing mortality, because we expect the competition-mediated growth effects to be stronger when fishing mortality is low. The outcome will be compared with competition strengths calculated on the basis of food overlap. If the patterns are consistent, this provides a strong cross-validation of both datasets, and a strong argument in favour of the ecosystem approach. Inconsistencies between the datasets can be used to modify the calculation of competition strength from diet data, and contribute to a better insight into the ecological interactions which shape the production of harvestable fish biomass.
Why should this be funded by KB WOT?	This project aims to maximize the extraction of information that is embedded in the different datasets collected in IMARES (by cross-validation) and combine them to obtain missing information and hypotheses. In essence, we propose to use data already present to give us a head start in the implementation of and the science behind an ecosystem approach to fisheries management in the North Sea.
How does this relate to the IMARES development plan*	This project fits into the 'marine policy' spearhead formulated in the development plan. While it does not directly develops or evaluates marine policy, it provides insight into the strength of diet overlap
Products to be delivered?	A paper discussing the (in)consistency of growth and diet data of (flat)fish in the North Sea.
How is dissemination of findings being addressed?	
Proposed budget	Research hours by scale: 500 hours JONDZ, €100*500=€50,000.- Additional expenditure: Conferences and publication fees: 5k€ Total cost: € 55,000.-
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	Limited resources may become available from the BASIC EU-project, provided that a pending application for extension is granted.
What are the potential risks to the project's success?	There is a risk that no relationships will be found in the data. If this is because there simply are no relationships it is an interesting result, but it will be difficult to prove that such a negative result is not due to data scarcity/inaccuracy.

Not funded as proposal needs further development

Justification

This report

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